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Abandoned Mine Reclamation Project

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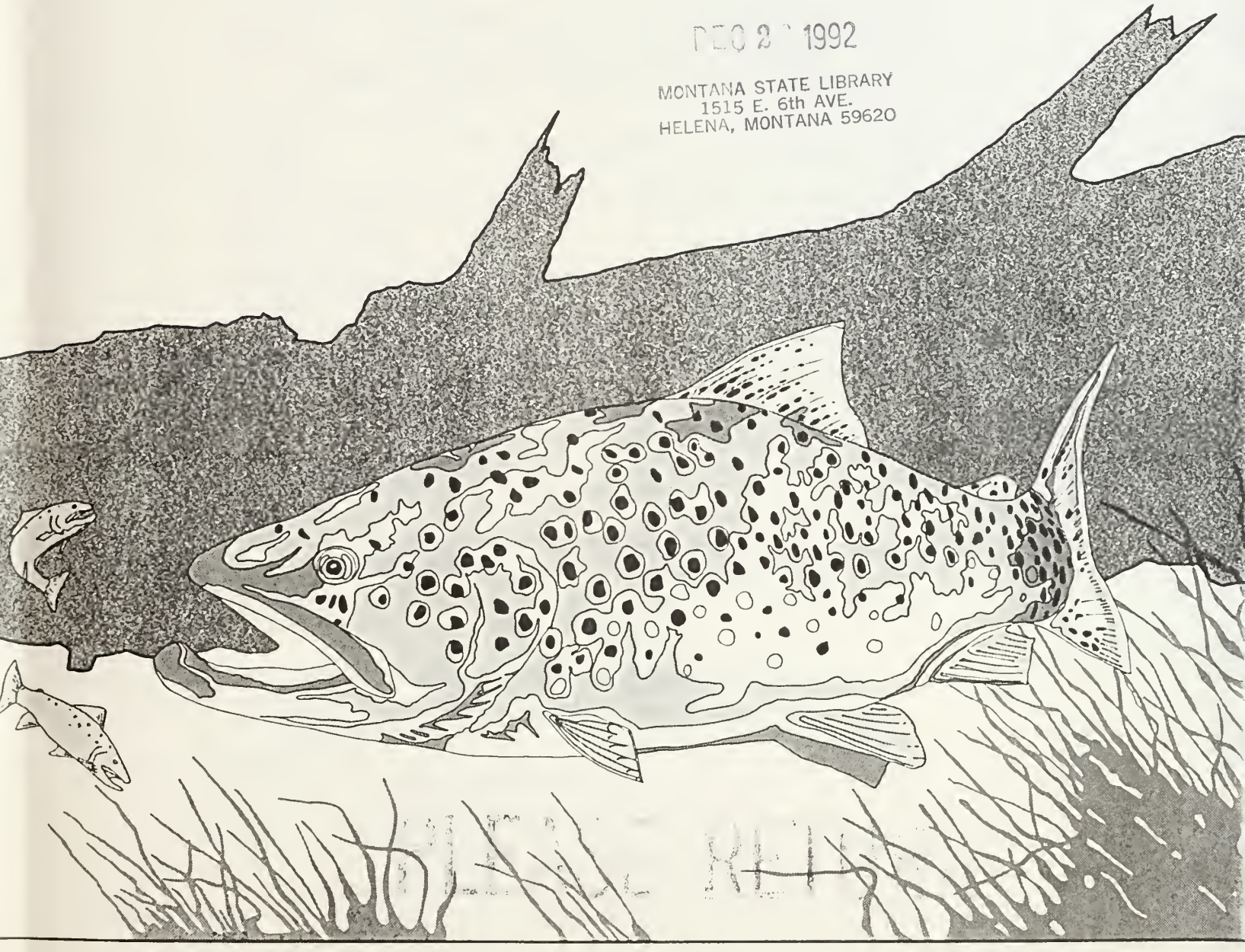

Montana Department of State Lands
Abandoned Mine Reclamation Bureau
and
United States Department of the Interior
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ENVIRONMENTAL ASSESSMENT

UPPER BLACKFOOT RIVER

Abandoned Mine Reclamation Project - Phase I

Lewis and Clark County, Montana

Prepared By

ABANDONED MINE RECLAMATION BUREAU
MONTANA DEPARTMENT OF STATE LANDS

In Cooperation with

United States Department of Interior
Office of Surface Mining Reclamation and Enforcement

FEBRUARY, 1991

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CHAPTER I. INTRODUCTION

A. Purpose and Need for the Action

The Montana Department of State Lands (MDSL), Abandoned Mine Reclamation Bureau (AMRB) has chosen to study the Upper Blackfoot River, Lewis and Clark County, to determine how environmental problems and potential human health and safety concerns can be reduced or eliminated. The project is proposed for funding under Title IV of the Surface Mining and Control Act (SMCRA) of 1977, and administered by the Department of Interior's Office of Surface Mining Reclamation and Enforcement (OSMRE). Phase I of the Upper Blackfoot River abandoned mine land reclamation project includes the following individual mine sites: Anaconda, Mike Horse, Carbonate, Edith and Mary P. Also included in this environmental analysis is the Meadow Creek coversoil borrow site.

Many hazards to public health and safety exist in the Upper Blackfoot project area. Further, sources of substantial environmental degradation from past mining practices are prominent in the project area. The following undesirable conditions on the site require relief.

- Unsound structures, buildings and other mining related debris.
- Open mine shafts and adits.
- Acid generating and devegetated mine spoils containing elevated levels of heavy metals. These spoils erode to off-site locations, including the Blackfoot River during runoff events.
- Creek, river and mine drainage waters in contact with the mine spoils.
- Production of acidic mine drainage water.

The proposed reclamation of the Upper Blackfoot Phase I Project would eliminate mine related existing safety and health hazards to persons entering the area. Additionally, visual aesthetics and environmental degradation of the area would be dramatically improved. Since public access to the project area is readily available, these are important benefits. The purpose of this reclamation project is summarized in the following goals and objectives listed by project site:

Carbonate Mine Site

- Clean up site debris to eliminate potential site safety hazards.
- Eliminate the potential safety hazards associated with the open mine shaft.
- Revegetate devegetated mine spoils.
- Isolate highly mineralized spoils material (mill tailings and waste rock) from wind and water contact.
- Reduce erosion and runoff of acid generating metal laden mine spoils.
- Improve mining-disturbed land productivity and site aesthetics.
- Reduce current water quality degradation caused by mine spoils/water contact.
- Recreate mine damaged wetland environment.

Anaconda Mine Site

- Clean up site debris to eliminate potential site safety hazards.
- Eliminate the potential safety hazards associated with mine openings.
- Neutralize and revegetate devegetated mine spoils.
- Reduce erosion and runoff of acid generating metal laden mine spoils.
- Improve mining-disturbed land productivity and site aesthetics.
- Control and treat acid mine drainage.
- Reduce current water quality degradation caused by acid mine drainage and mine spoils/water contact.

Mike Horse Mine Site

- Clean up site debris and unstable structures to eliminate site safety hazards.
- Eliminate the potential safety hazards associated with mine openings.
- Neutralize and revegetate devegetated mine spoils.
- Reduce erosion and runoff of acid generating metal laden mine spoils.
- Improve mining-disturbed land productivity and site aesthetics.
- Control and treat acid mine drainage.
- Reduce current water quality degradation caused by acid mine drainage and mine spoils/water contact.

Edith Mine Site

- Clean up site debris and remove unstable structure to eliminate site safety hazards.
- Eliminate the potential safety hazards associated with the open mine adit.
- Neutralize and revegetate barren mine spoils.
- Reduce erosion and runoff of acid-generating heavy-metal laden mine spoils.
- Improve mining-disturbed land productivity and site aesthetics.
- Reduce current water quality degradation caused by mine spoils/water contact.

Mary P. Mine Site

- Neutralize and revegetate devegetated mine spoils.
- Reduce erosion and runoff of acid-generating metal-laden mine spoils.

- Improve mining-disturbed land productivity and site aesthetics.
- Reduce current water quality degradation caused by mine spoils/water contact.

Meadow Creek Borrow Area

- Use area soils as coversoil for Upper Blackfoot project mine sites.
- Revegetate borrow area upon completion of reclamation activities.

The Office of Surface Mining (OSM) Field Office Director has been requested to approve a Federal construction grant in the amount of $364,335 to implement an abandoned mine land reclamation project and accomplish the purpose described above.

B. Project Background/General Information

The vicinity of the Upper Blackfoot project area is indicated in Figure 1. Figure 2 identifies locations of individual mine sites included in the project. The project area is approximately 15 miles east of Lincoln, Montana, in Lewis and Clark County. The project area lies on patented mining land immediately surrounded by the Helena National Forest.

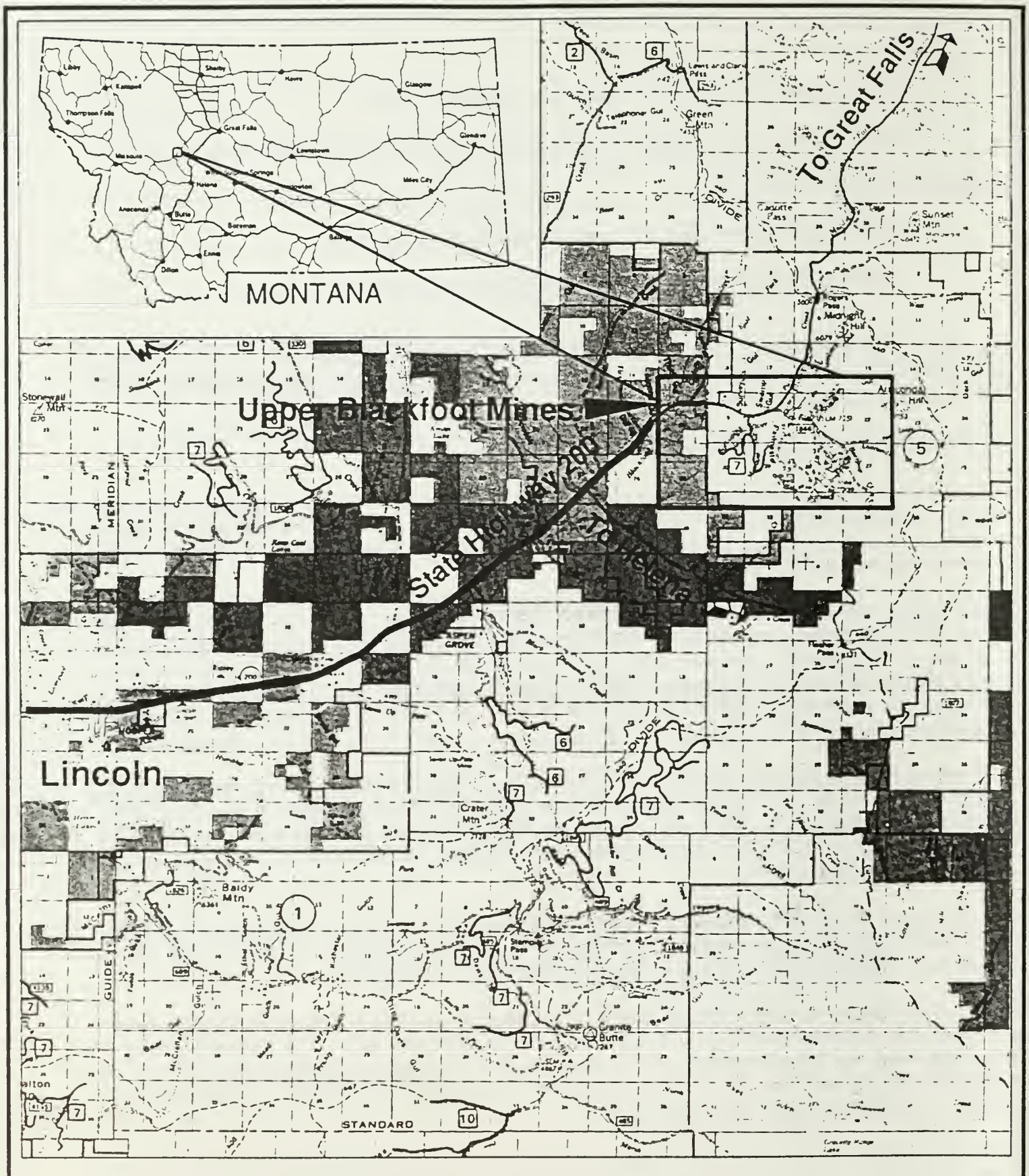
Phase I of the upper Blackfoot mine reclamation project is intended to be executed in conjunction with Phase II, although Phase II reclamation activities are not currently scheduled to receive an OSM grant this fiscal year. Reclamation of Phase II of the upper Blackfoot project includes drainages and river areas outside of the project area associated with Phase I reclamation. Although Phase I and Phase II reclamation activities of the upper Blackfoot abandoned mine reclamation project are similar, separate environmental assessments will be done for each phase.

Initial mining began in the project area in 1898 by the Sterling Mining and Milling Company, while milling production began in 1919. A variety of mineral commodities were recovered including gold, silver, lead, copper and zinc (McClearnan, 1983). Of the Upper Blackfoot Project mines, the Edith and Mary P. mines were the first abandoned in 1926. The Anaconda, Mike Horse and Carbonate mines were presumably in operation at least through 1958.

The total area of mining-disturbed surface for the project area is 15.1 acres. Surface and mineral rights are held exclusively by the American Smelting and Refining Company (ASARCO). Both the U.S. Forest Service and Lewis and Clark County own access corridors and bordering lands.

In 1975, dam failure of the Mike Horse tailings pond caused large quantities of water to wash contaminated sediments into Beartrap creek and subsequently into the Blackfoot River. The dam was repaired immediately after the time of the break. The force and velocity of the water breaching the dam scoured through the already fragile creek and river channels. The result was mine-waste sediment deposition throughout and downstream of the project area.

In addition to the tailings dam, mine spoils from each of the mine sites are typically located in or immediately adjacent to established water courses. The common practice of mine waste disposal included dumping wastes directly downhill from mine openings, regardless of environmental consequences. This practice has facilitated degradation of water, soil and vegetative conditions. Waters flowing through the spoils, as well as emanating from the mine openings, are contaminated with heavy metals which precipitate as stream sediments. During snowmelt runoff and storm events, these mine waste sediments are resuspended and transported farther down the Blackfoot River Drainage.



Upper Blackfoot River
Abandoned Mine Reclamation Project

Figure 1 - Vicinity Map

Land surrounding the mine sites includes habitat suitable for wildlife. A common land use in the upper Blackfoot River drainage is recreation and the area is widely and successfully used by big game hunters. Degraded water quality due to past mining practices has reduced or eliminated the fishery habitat and population in the immediate project area. Therefore, recreational fishing is not a current land use. The five mine sites are either located on Beartrap Creek or the Blackfoot River (Figure 2). The Blackfoot River is listed as a Class I trout stream by the Montana Department of Fish, Wildlife and Parks. Several miles downstream of the project area, the river is widely known for its fishing, boating, camping and other recreational resource values. Disturbance at the immediate mine sites precludes safe recreational use of the project area.

In 1986 and 1988, Resource Indemnity Trust (RIT) grants for reclamation of the Upper Blackfoot Project were obtained from the Montana Department of Natural Resources and Conservation (MDNRC) in the collective amount of $400,000. In addition, $15,000 was contributed to the reclamation project by the Montana Department of Health and Environmental Sciences (MDHES), Water Quality Bureau, and another $7,000 was contributed by the MDNRC. Through additional site assessment work and an expansion of project goals, Phase I of the project is estimated to cost $786,335. The current grant amount requested from OSM for the Proposed Action is $364,335.

C. Existing/Related Environmental Documents

A search conducted by the Natural Resource Information System program staff at the Montana State Library identified existing and related Environmental Assessments and Environmental Impact Statements. The search revealed the following documents consulted in the preparation of this document.

The final environmental impact statement (EIS) on the "Approval of State and Indian Reclamation Program Grants Under Title IV of the Surface Mining Control and Reclamation Act of 1977" was issued by the Office of Surface Mining Reclamation and Enforcement in November 1983. The EIS describes and analyzes the environmental impacts that would result from approval of State or Tribal grants. It concentrates on the adverse/beneficial impacts and standard reclamation activities associated with eight major categories of abandoned coal mine problems in the United States. This EIS has little in relationship to the Upper Blackfoot project since the project relates to past hard rock mining, as opposed to coal mining.

The U.S. Forest Service, Helena National Forest, "Environmental Impact Statement for the Helena National Forest Land and Resource Management Plan," (April 1986) analyzes alternative forest plans for the Helena National Forest. The Upper Blackfoot Phase I project environmental assessment and proposed work is consistent with this EIS.

Also related to the project is the MDNRC, Water Development and Renewable Resources Development Grant Programs, "Environmental Assessment for the Upper Blackfoot Reclamation Project," prepared in May 1986 and May 1988. Although this document is specific to the project site, it consists primarily of environmental assessment checklists with little or no helpful information.

Several research projects have previously been conducted in the project area. Although not directly incorporated into this environmental assessment or other existing environmental documents, the research information has been used in the preparation of this document. Reports by Ingman et al (1990), Dollhopf (1988), Decker-Hess (1978), Moore (1990), and Spence (1975) are cited throughout this environmental assessment and referenced in Chapter VI.

CHAPTER II. DESCRIPTION OF THE ALTERNATIVES

All alternatives under consideration for the Upper Blackfoot Phase I project involve mining disturbed area in Sections 20, 21, 27, 28 and 29 of T15N, R6W, Lewis and Clark County, Montana. Figures 3 through 7 detail individual site features of the Carbonate, Anaconda, Mike Horse, Edith and Mary P. sites. The Phase I alternatives would preclude reclamation of sites proposed for reclamation under Phase II activities. The total mining disturbed area at these sites is approximately 15.1 acres. Problems associated with past mining which will not be abated by Phase I reclamation will exist on 25 acres in the area. These mining related problems will be addressed under Phase II reclamation activities for the Upper Blackfoot River. Phase II reclamation will address the following objectives at five sites:

* Stabilization and revegetation of the Blackfoot River and Beartrap Creek drainages impacted by the Mike Horse tailings dam break
* Reestablishment of the channelized wetland and river system
* Removal of hazards associated with unsound structures and mine openings
* Improvement of environmental problems associated with barren mine spoils, spoils in contact with water, and acid mine drainage.

Future land uses in the immediate project area may include recreation, resource development and sustenance of wildlife habitat. Area surrounding the project is owned by the U.S. Forest Service and managed by the Helena National Forest. The Forest Plan for the area (adopted by the Helena National Forest in 1986) intends future land uses to be compatible with the maintenance of suitable spring, summer and fall wildlife habitat, with some livestock grazing allotments in parts, and possible timber management activities.

A. Primary Alternatives Under Analysis

Table 1 summarizes the reclamation alternatives.

1. Alternative 1: Approve the Proposed Construction Grant (Proposed Action)

Under this alternative, the OSMRE Field Director would approve a Federal construction grant in the amount of $364,335 for use by the AMRB (in conjunction with RIT, DNRC, and DHES funds) in implementing the following abandoned mine reclamation proposal:

Carbonate Mine Site
- site dewatering during construction
- clean up site debris
- relocate highly mineralized mine spoils to an on-site deposition area, install engineered liner system including a bentonite seal and synthetic membrane
- grade steep spoil slopes to stable gradient
- in place disposal of remaining spoils including lime neutralization, coversoiling and revegetation of disturbed area
- close abandoned mine shaft by backfilling
- restore wetland environment through spoils excavation, limestone neutralization, installation of peat material and an erosion-control mat.
- fence lined disposal area

Anaconda Mine Site
- install sedimentation basin and streamside silt barriers to abate construction-related erosion
- install temporary creek crossing
- clean up site debris
- on- and off-site disposal of central mine spoils, grade and compact into wetland dikes, removal of spoils from creek banks

Upper Blackfoot River
Abandoned Mine Reclamation Project

Figure 2 - Site Location Map

Carbonate

Edith

Mary P.

Meadow Creek
Borrow Area

Anaconda

Mike Horse

To Great Falls
Approx. 66 Miles

To Lincoln 10 Miles

To Helena
47 Miles

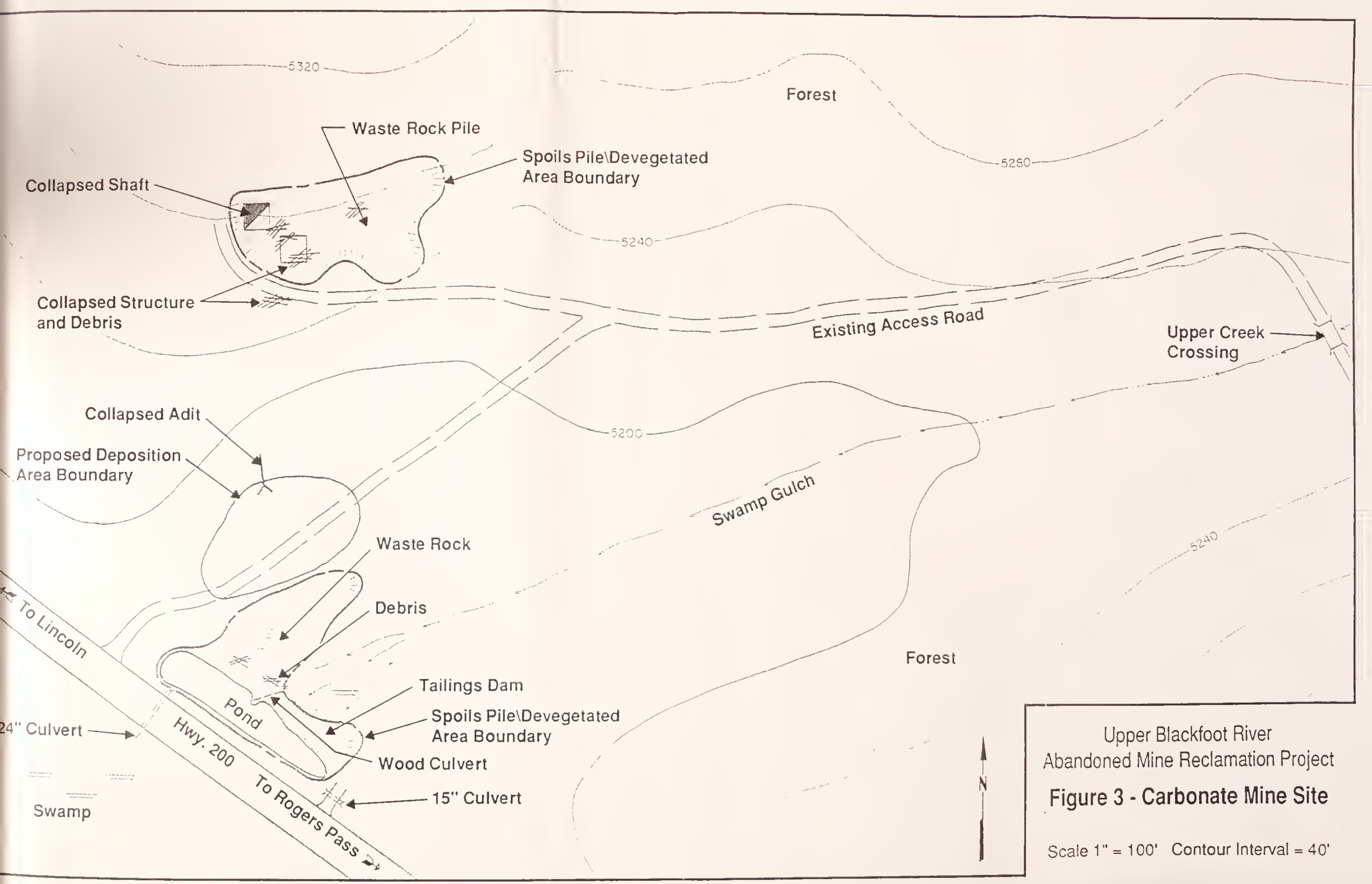
Scale 1"= 2000'

Lewis & Clark County, Montana
USGS Rogers Pass and Cadotte Creek Quads

R7W

R6W

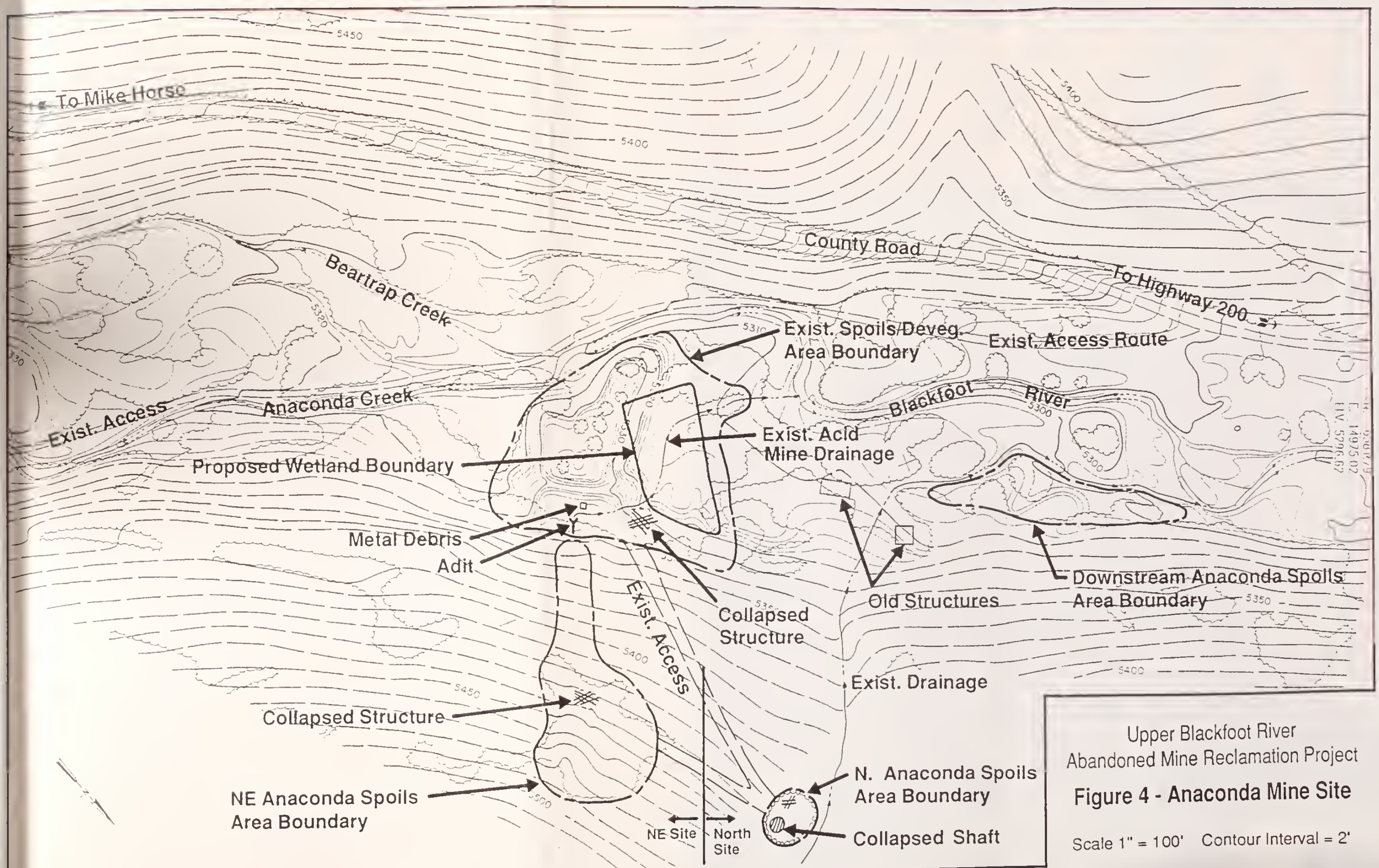
T15N



Upper Blackfoot River
Abandoned Mine Reclamation Project

Figure 3 - Carbonate Mine Site

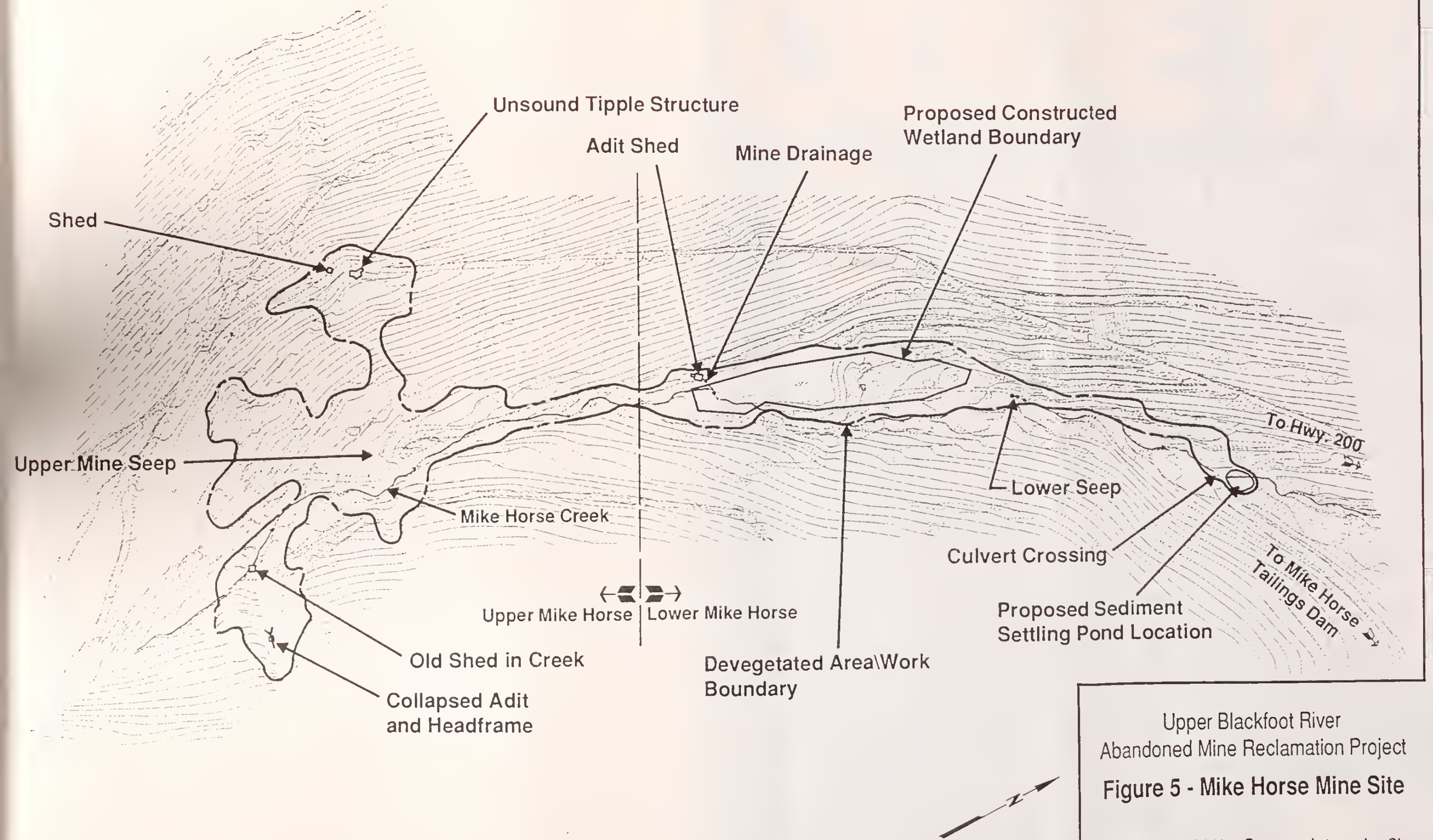
Scale 1" = 100' Contour Interval = 40'



Upper Blackfoot River
Abandoned Mine Reclamation Project

Figure 4 - Anaconda Mine Site

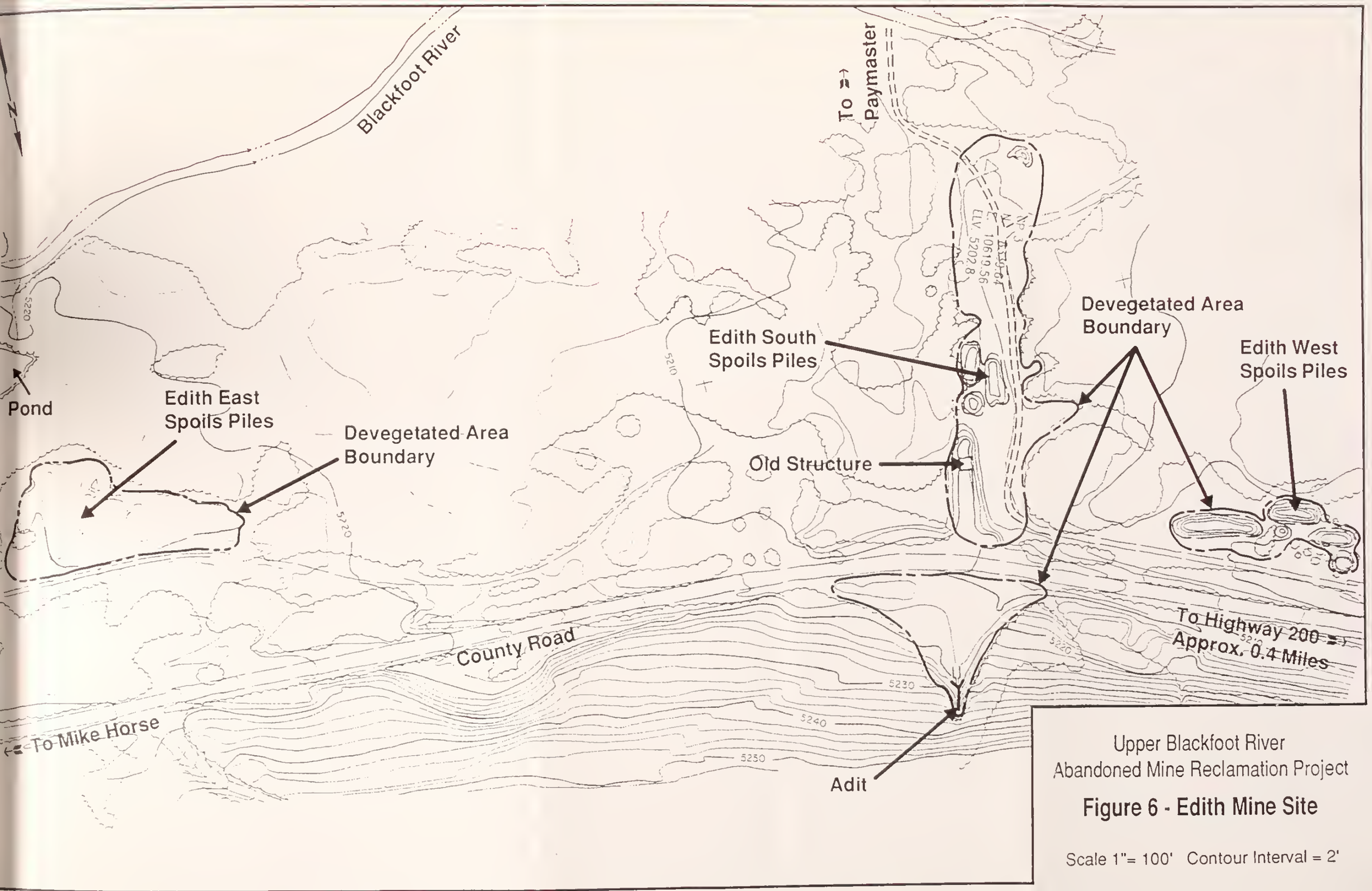
Scale 1" = 100' Contour Interval = 2'



Upper Blackfoot River
Abandoned Mine Reclamation Project

Figure 5 - Mike Horse Mine Site

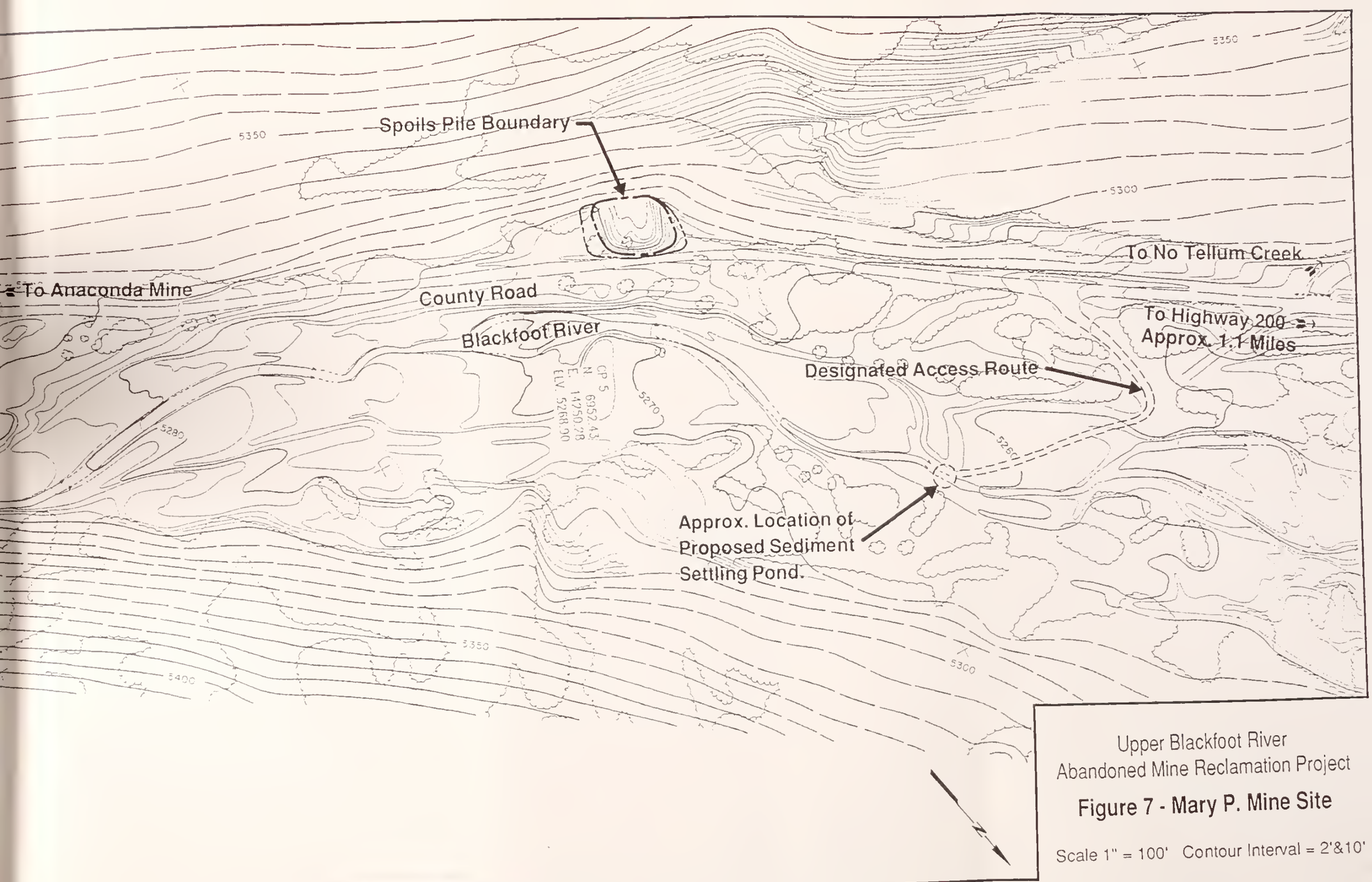
Scale 1" = 200' Contour Interval = 2'



Upper Blackfoot River
Abandoned Mine Reclamation Project

Figure 6 - Edith Mine Site

Scale 1"= 100' Contour Interval = 2'



Upper Blackfoot River
Abandoned Mine Reclamation Project

Figure 7 - Mary P. Mine Site

Scale 1" = 100' Contour Interval = 2'&10'

TABLE 1 - SUMMARY OF ALTERNATIVES

UPPER BLACKFOOT RIVER

Alternatives	Description of the Alternative	Disturbed Acreage Reclaimed	Requested Grant Amount
Alternative 1: Proposed Action	Clean up site debris; remove unsound structures; neutralize and revegetate devegetated mine spoils, isolate highly mineralized mine tailings; control and treat acid mine drainage using passive wetland treatment; close mine adits and shafts. These actions will be executed in varying combinations at the following mine sites: Carbonate, Anaconda, Mike Horse, Edith and Mary P.	15.1	$364,335.00
Alternative 2: No Action	Leave project area in existing condition: do not reclaim.	0	$0.00
Alternative 3: Modification of the Proposed Action	Same as Proposed Action with the following modifications: - omit constructed wetlands at the Anaconda and Mike Horse mine sites - omit reclamation of the Edith mine site - omit reclamation of the Mary P. mine site - omit bentonite/membrane liner tailings isolation at the Carbonate mine site	12.1	$81,112.00
Alternative 4: Modifications of the Proposed Action	Same as Proposed Action with the following modifications: - omit reclamation of the Carbonate shaft area; north, northeast and downstream Anaconda areas; and the upper Mike Horse area - omit reclamation of the Edith mine site - omit reclamation of the Mary P. mine site.	5.0	$188,149.00

- . grade and lime neutralize remaining mine spoils, import cover soil and revegetate disturbed area
- construct wetlands to facilitate treatment of acid mine drainage, including a limestone treatment trench
- close mine adit and construct drainage structure to control mine drainage, routing to wetland
- improve and reclaim site access
- backfill collapsed mine shaft

Mike Horse Mine Site
- reconstruct drainage channel through channel realignment, installation of bank stabilization fabric and placement of riprap
- on site disposal of central mine spoils, grade and compact into wetland dikes, including moving spoils which are chemically similar from the Anaconda mine site
- grade steep spoil slopes to a more stabilized gradient, lime neutralize and revegetate
- in place disposal of upper area spoils: apply lime to devegetated areas, import cover soil, revegetate disturbed area, transplant forest and streambank vegetation
- construct wetland to facilitate treatment of acid mine drainage
- close mine adit, construct drainage structure, and route collected mine drainage to wetland
- install sedimentation basin and stream-side silt barriers to abate construction related erosion
- construct auxiliary limestone treatment pond downgradient of constructed wetland
- clean up site debris and remove unsound structures

Edith Mine Site
- clean up site debris and dispose of dilapidated structure
- grade steep spoil slopes to a stabilized gradient
- relocate Edith west spoils to central deposition area, lime neutralize mine spoils, import cover soil and revegetate
- on site reclamation of remaining spoils; lime, coversoil and revegetate
- lime, coversoil and revegetate mining disturbed areas
- close abandoned mine opening

Mary P. Mine Site
- grade steep soil and spoil slopes to a stabilized gradient
- lime neutralize mine spoils, import cover soil and revegetate
- regrade roadside ditch

Meadow Creek Borrow Area
- remove and stockpile upper six inches of topsoil
- excavate and haul borrow material to mine sites
- grade to match existing contours and replace topsoil

The Proposed Action alternative would allow reclamation of 15.1 acres of mining disturbed area, and 11.5 acres at the borrow site. It would facilitate closure of five mine openings, either by backfilling or installing adit drainage structures. Debris may be burned or buried on site, or removed where appropriate.

Spoils from the Anaconda and Mike Horse mine sites would be used to construct wetland dikes and lagoon systems. To avoid spoils/water contact, the lagoons would be isolated with a bentonite seal overlain with a synthetic membrane liner. The Carbonate mine spoils would be uniquely isolated by adding a lime veneer underlayer and installing a bentonite/synthetic membrane liner and coversoil. Neutralization of the remaining mine spoils at all sites (including Edith and Mary P.) would include liming, followed by coversoiling and revegetation. Extremely steep spoil slopes (70% or greater) at the upper Mike Horse area would be lime neutralized and reforested with evergreen seedlings. Disturbed areas serving as deposition sites for mine wastes would be similarly lime neutralized, coversoiled and revegetated.

Acidic mine drainage would be collected in structures at the adits, then routed through constructed wetlands. Wetland construction would include establishing compacted dikes, and installing a bentonite seal and synthetic membrane liner system, filter gravel, organic substrate (peat), wetland vegetation, and process control structures. Outer wetland dikes would be lime-neutralized, coversoiled and vegetated. The Anaconda site wetland system would additionally include an anoxic limestone treatment trench to enhance wetland efficiency. The Mike Horse system would include an emergency flow bypass system to a limestone treatment pond. Both the Anaconda and Mike Horse wetland treatment systems would include site grading to route surface waters around the wetlands.

Establishing a created wetland at the Carbonate site would be accomplished by the following procedures: excavation of deposited mine spoils, placement of a limestone veneer coating on the excavated area, and installation of peat material which would be stabilized by an erosion control mat. The intent at the Carbonate site is to restore the past wetland environment and provide natural treatment of acid mine drainage waters in the Swamp Gulch area.

Reduction of steep slopes to a stabilized gradient would reduce site erosion. Controlling area water during construction, and utilizing sediment control devices would minimize sedimentation to the Blackfoot River. Erosion control measures to facilitate site reclamation also include revegetation. The revegetation process would involve placement of coversoil on limed spoils, fertilizing, seeding and mulching. Protection of the reconstructed stream channels would include bank stabilization fabric, rip rap and transplanted streambank vegetation. Project construction activities would warrant installation of a single sedimentation basin downstream of the mine sites to serve as an emergency catch basin. The basin would serve as supplemental sediment control during the construction phase of the reclamation project. The Anaconda and Mike Horse sites would have additional sediment control basins located directly downstream of the project sites.

The proposed time schedule for Alternative 1 is as follows:

Present: Finalization of preliminary design. Additional site sampling and analysis. Compliance with National Contingency Plan. Preparation budget/cost estimates. Bid and award contract for reclamation construction.

Summer 1991: Reclamation construction of proposed project.

Fall 1991: Construction completion and seeding before winter.

1991-1992: Monitoring of vegetative growth, water treatment effectiveness and weed control.

The contractor would have two months to complete the project from initiation of construction. A full-time construction inspector would be on site to provide quality control of reclamation construction.

2. Alternative 2: Deny the Proposed Construction Grant (No Action)

Under this alternative, the OSMRE Field Director would deny a Federal construction grant in the amount of $364,335 for use by the AMRB (in conjunction with RIT, DNRC, and DHES funds) in implementing the abandoned mine reclamation proposal. As a result of denying the Federal construction grant, Upper Blackfoot project area would remain in its current condition as described in Chapter I.B.

The No Action Alternative would not address any of the existing site problems. The 15.1 mining disturbed acres would remain unreclaimed. Dangerous mine openings, exposed tailings piles, dilapidated structures and site debris would continue to pose hazards to human health and safety. Water quality, as well as fish and wildlife habitat, would either remain in their current degraded

condition, or continue to further deteriorate. Heavy metal-laden sediments would continue to enter the Upper Blackfoot River and migrate downstream.

B. Other Reasonable Alternatives

3. Alternative 3: Approve the Proposed Construction Grant, as Modified:

Under this alternative, the OSMRE Field Director would approve a Federal construction grant in the amount of $81,112 for use by the AMRB (in conjunction with RIT, DNRC, and DHES funds) in implementing the following abandoned mine reclamation proposal described under Alternative 1, with the following modifications:

Carbonate Mine Site
- delete use of any liner system for isolation of the mineralized tailings
- replace the liner with an application of lime to neutralize the spoils, followed by coversoiling and revegetation

Anaconda Mine Site
- omit constructed wetland

Mike Horse Mine Site
- omit constructed wetland

Edith Mine Site
- no action, leave site in existing condition

Mary P. Mine Site
- no action, leave site in existing condition

Reclamation would occur on 12.1 of the 15.1 mining disturbed acres, and 5 acres at the Meadow Creek borrow area. Implementation of this alternative would likely facilitate effective disposal of mine spoils at the Anaconda and Mike Horse mine site, but not necessarily at the Carbonate mine site. The tailings at the Carbonate site are of a fine grained nature due to past milling processes. The fineness of the tailings enhances their transport and contamination potentials, making them much more environmentally dangerous. Liming, coversoiling and revegetating the Carbonate mine site spoils provides a limited isolation of these fine grained mine tailings. The factor of safety provided by the bentonite and synthetic membrane liner would not be present under this alternative.

By omitting the construction of wetlands, acid mine drainage from the Anaconda and Mike Horse mine sites would remain untreated. Metal contamination associated with the acid mine drainage would remain, thus continuing to degrade the water quality of the Blackfoot River.

Leaving the Edith and Mary P. mines sites in their existing conditions would continue to cause further environmental degradation due to exposed mine spoils. Additionally, the mine opening and site debris at the Edith mine site would also remain as safety hazards.

The project schedule would not change from that presented in Alternative 1 (Proposed Action).

4. Alternative 4: Approve the Proposed Construction Grant, as Modified:

Under this alternative, the OSMRE Field Office Director would approve a Federal construction grant in the amount of $188,149 for use by the AMRB (in conjunction with RIT, DNRC, and DHES funds)

in implementing the abandoned mine land reclamation proposal described under Alternative 1, with the following modification:

Carbonate Mine Site
- leave upper shaft area in its existing condition

Anaconda Mine Site
- omit reclamation of all spoils piles except those immediately between the flowing adit and the river

Mike Horse Mine Site
- omit reclamation of the upper mine spoils piles above the flowing adit

Edith Mine Site
- no action, leave site in existing condition

Mary P. Mine Site
- no action, leave site in existing condition

Five of the 15.1 mining disturbed acres would be reclaimed under Alternative 4. Unreclaimed spoils piles associated with this alternative are small in volume in comparison with total spoils material in the Phase I project area. Under this alternative, those spoils most seriously degrading the environment would be properly removed. Constructed wetlands to treat acid-mine drainage at the Anaconda and Mike Horse sites would reduce heavy metal input to the river system. Leaving the adjoining spoils unreclaimed at the Carbonate, Anaconda and Mike Horse mine sites would continue to facilitate environmental degradation to a limited degree. Unreclaimed spoils would continue to erode by wind and water. Water erosion, in particular, would continue to add to water quality degradation. The aesthetic nuisance and degraded wildlife habitat resulting from the denuded spoils would also remain.

Under this alternative, the open mine shaft and debris at the upper Carbonate mine site would continue to present safety hazards. At the Edith mine site, the mine adit and debris would pose similar hazards to human health and safety.

Leaving the Edith and Mary P. mines sites in their existing conditions would continue to cause environmental degradation because of exposed mine spoil piles.

The project schedule would not change from Alternative 1 (Proposed Action).

C. Other Alternatives Considered but Eliminated from Detailed Analysis

To address the many possible reclamation alternatives for this project an Engineering Evaluation/Cost Analysis (EE/CA) matrix has been developed for the individual reclamation problems. The matrix ranks each potential action to a problem by evaluation of the EE/CA criteria. This compiled evaluation is located in Appendix B and includes a description of the EE/CA criteria and potential actions.

Potential actions were eliminated from consideration as part of a reasonable alternative if they received a low ranking compared to other potential actions for a problem solution. However, some low ranking potential actions are still included in the other reasonable and preferred alternatives, if they become more viable when combined with other potential actions. The viable potential actions are included in the preferred and other reasonable alternatives discussed earlier in this chapter.

Following is a summary listing of site problems and their potential action eliminated from detailed analysis, including a brief explanation of why the action was dismissed.

Problem 1: Mine-related unsound structures.

Structure/building repair (restore) - impractical, not consistent with landowner future use, landowner and state liability associated with a post-construction accident, minimal effective longevity and potentially high maintenance costs.

Fencing and signing (restrict entry) - lack of effectiveness, potential health and safety hazard and associated liability not removed, inappropriate technology and not consistent with future land use.

Problem 2: Hazardous mine openings..

Fencing and signing (restrict entry) - lack of effectiveness, potential health and safety hazard and associated liability not removed, inappropriate technology and not consistent with future land use.

Problem 3: Acid generating devegetated mine spoils.

Haul Off-Site to Licensed Disposal Area - very high cost given amount of material and distance to disposal area.

Backfill spoils into mine openings (return to origin) - inappropriate technology with water-filled openings, environmental degradation (groundwater), technically unfeasible and ineffective (since all spoils would not fit).

Processing or treatment of spoils (remove metals and acid-generating ability) - technologically difficult, limited effectiveness and implementability, high cost and lengthy construction time.

Problem 4: Mine spoils in contact with water.

Water treatment below site (treatment plant for degraded water quality) - negative health impact still on-site; high cost, construction time and maintenance requirements.

Eliminatation of water flow (stop seeps) - inappropriate technology, questionable feasibility and legality, difficult implementability, high cost, lengthy construction time and high maintenance requirements.

Fencing and signing (restrict entry) - lack of effectiveness; health hazard, environmental degradation and associated liability not removed; inappropriate technology and not consistent with future land use.

Problem 5: Mine-Impacted Drainage.

Fencing and signing (restrict entry) - lack of effectiveness; health hazard, environmental degradation and associated liability not removed; inappropriate technology and not consistent with future land use.

Problem 6: Steep Devegetated Slopes.

Erosion Control Mat; Log Stabilization Structures; Geo Fabrics and Riprap Slopes - None of these actions are currently incorporated in the potential alternatives but may be incorporated into the final design in a limited basis due to high cost.

Fencing and signing (restrict entry) - lack of effectiveness; health hazard, environmental degradation and associated liability not removed; inappropriate technology and not consistent with future land use.

Problem 7: Acid Mine Drainage.

Treatment facility (treatment plant for degraded water quality) - high cost, construction time and maintenance requirements, additional cost not justified as proposed alternative would eliminate need for additional treatment.

Air or water seal mine opening (eliminate air or water component of acid generation) - difficult implementability, lack of effectiveness, inappropriate technology given site conditions and high cost.

Bacterial or surfactant injection (into mine openings to reduce acid generation) - inappropriate technology given site conditions, experimental and questionable technology, difficult implementability, high cost, questionable longevity and maintenance requirements.

Water recharge reduction (reduce groundwater flow through mine workings) - difficult implementability, questionable effectiveness and longevity, and inappropriate technology.

Collapse mine workings - ineffective, possible adverse environmental impact, difficult implementability, and inappropriate technology.

Artificially recharge groundwater (force mine drainage into ground water) - adverse environmental impact on ground water, inappropriate technology.

Irrigate surrounding area with mine drainage - adverse environmental impact, high cost and maintenance requirements, inappropriate technology, inconsistent with future land use and potential liability concern.

Fencing and signing (restrict entry) - lack of effectiveness; health hazard, environmental degradation and associated liability not removed; inappropriate technology and not consistent with future land use.

Rock phosphate or zeolite water treatment methods - questionable feasibility, effectiveness, and technology.

CHAPTER III. AFFECTED ENVIRONMENT

A. General Setting

Narrow valleys break through steep forested slopes in the headwaters of the Blackfoot River, two miles west of the Continental Divide. Mine sites in the project area occur within a two-mile radius, with the Carbonate mine farthest west and the Mike Horse at the southeastern edge of the project area. Project area elevations range from 5,000 to 6,200 feet, at the Carbonate and Mike Horse mines, respectively.

Although the general area of the western Continental Divide along Highway 200 is typically undisturbed forested mountains, the immediate project area has been substantially damaged by nearly 100 years of extensive mining. The project area displays unsightly spoils piles, devegetated slopes, scattered debris, and deep rust-colored creeks originating from mine adits.

B. Critical Elements

1. Cultural, paleontological, or historic resource values

The Montana State Historic Preservation Office (SHPO) has determined that historic remains located within the project area do not qualify for eligibility to the National Register of Historic Places. No other cultural resource sites in the immediate area are listed on the National Register of Historic Places. The proposed project will have no effect on significant cultural values.

Paleontologic of archaeologic resources of recognized significance are not known to exist in the project area. Extensive ground disturbances have resulted from past mining activities. Reclamation activities would not further the extent of site disturbance. In the event that paleontologic or archaeologic resources are discovered during reclamation activities, construction would be halted to allow the SHPO review of the discovery.

2. Water quality/supply values

Headwaters of the Blackfoot River originate in the immediate project area. Tributaries in the headwaters region have relatively distinct slope changes. Specific bodies of water in the project area include Beartrap Creek, Anaconda Creek, Swamp Gulch, two drainages originating from mine adits, and several seeps . Pass Creek and Paymaster Gulch converge with the Blackfoot River directly upstream from the Carbonate mine, in an area of dispersed natural wetlands.

The Blackfoot River is designated as a B-1 stream by the State of Montana (Water Quality Bureau, MDHES). A B-1 stream classification requires that water quality is to be maintained suitable for drinking, culinary and food processing purposes after adequate treatment (Montana Surface Water Quality Standards, 1988).

The Blackfoot River along with its headwater tributaries and adjacent wetlands, have received extensive contamination from several sources including: 1) acid mine drainage originating from the Mike Horse, Anaconda and Carbonate mine sites, 2) the dam break of the Mike Horse tailings pond in 1975, and 3) water contact with mine spoils having heavy metals and acid-producing substances. Appendix A summarizes water quality sampling.

Acid mine drainage water analyses show elevated levels of heavy metals including iron, copper, zinc, lead, cadmium, manganese and arsenic from the Anaconda and Mike Horse mine adits. Additionally, pH values have been found to be as low as 3.1 standard units. Collectively, acid mine drainages contribute as much as 200 gallons per minute to the Blackfoot River.

Breaching of the Mike Horse tailings dam in 1975 resulted in a substantial mobilization of unknown quantities of heavy metal laden sediments. The sediments were transported by Beartrap Creek

and directly to the Blackfoot River. As a result, contaminated sediment deposition has occurred throughout the project area. Effects of heavy metals originating from the project area have been documented as far as 15 miles downstream from the project site (Decker-Hess, 1978). Occurrences of runoff events facilitate further transport of sediments down the river.

Disruption of the Blackfoot River channel by random disposal of spoils in the low lying river bottoms causes the Blackfoot river to take unnatural paths. Commonly, the Blackfoot River is in direct contact with these spoils piles, adding to heavy metal, acid and suspended solid contamination of the river system.

3. Wetland values

Several dispersed wetlands occur adjacent to the Blackfoot River, both within and downstream of the project area. Based on Cowardine et al (1979), the wetlands in the project area can be classified as Plaustrine. Sedges and associated shrubs and lodgepole pine dominate these wetlands (Dollhopf, et al., 1988). Wetlands of this category are present for approximately two miles along the Blackfoot River from below the Edith Mine.

A 1978 study (Decker-Hess, 1978) included analysis of mine waste sediments on area wetlands. This study demonstrated a reduction in macro-invertebrate populations resulting from degraded wetland conditions resulting from poor water quality. Further, reduction in food supply and degraded water quality conditions are likely responsible for decreased utilization of the area wetlands by aquatic life.

4. Floodplain/unstable geology concerns

The DNRC Floodplain Management Section determined that designated floodplains do not exist in the project area (Fischer, 1991)

The Upper Blackfoot project lies within the Intermountain Seismic belt. Regional seismic activity has been recorded, however the closest recent activity appears to be related to the Scratchgravel Hills and Prickly Pear fault systems. The potential of these faults to endanger life or property is moderate to major according to an earthquake risk map of the United States (Keller, 1976).

Excessively steep slopes existing at some of the mine sites are near the angle of repose for the slope material.

5. Threatened or endangered plant/animal species

The Montana Natural Heritage Program files do not list plant species of particular concern for the project area.

U.S. Forest Service Land surrounding the project area is classified as Grizzly Management Situations #1 and #2 (Helena National Forest EIS, 1986). The project area has suitable summer alpine habitat for the grizzly bear, although sightings have not been recorded.

6. Migratory birds of high Federal Interest

The Fish and Wildlife Service, Department of Interior was contacted concerning the presence of migratory birds of high federal interest. Although the bald eagle and perigrin falcon may occur within the project area as spring or summer migrants, nest territories or significant habitats are not known to exist (McMaster, 1991).

The Fish and Wildlife Service requested that Swainson's hawk and its habitat be considered relative to the project area, although the hawk is not listed as threatened or endangered. Habitat

suitable for the Swainson's hawk primarily includes prairie streams with stands of cottonwood. Sightings of the hawk in the project area and surrounding vicinity have not been documented. Therefore, neither the Swainson's hawk nor its habitat are suspected to exist in the project area or surrounding vicinity.

7. Renewable resources/unique farmland values

Neither the proposed project area or the surrounding vicinity are designated as prime and unique farmland as per the Farmland Protection Policy Act (Kellogg, January, 1991). Weakly developed forest soils with shallow loam topsoils cover steep side slopes of the project area.

Coversoil required for project reclamation will likely come from a borrow area at Meadow Creek (Figure 8). Meadow Creek is a small alpine meadow with soil suitable for coversoil purposes related to reclamation activities.

8. Recreational resource values

The Bureau of Land Management has determined that no wild or scenic rivers exist in or near the project area. The Forest Plan for the Helena National Forest (April 1986) does not include the project area as part of a wilderness proposal.

The Scapegoat Wilderness is located approximately 9 air miles north west of the project area. Surrounding lands are not being proposed for wilderness designation. Areas of recognized scientific and aesthetic importance are absent from the immediate project vicinity.

Recreation in the area is semi-primitive. Recreational opportunities include the Continental Divide Scenic Trail to the west, extensive big game and grouse hunting, and four-wheeling. There are no developed camping facilities in the immediate or surrounding area. Other dispersed recreational opportunities in the region includes hiking, horseback riding, cross country skiing and snowmobiling.

9. Social and economic values

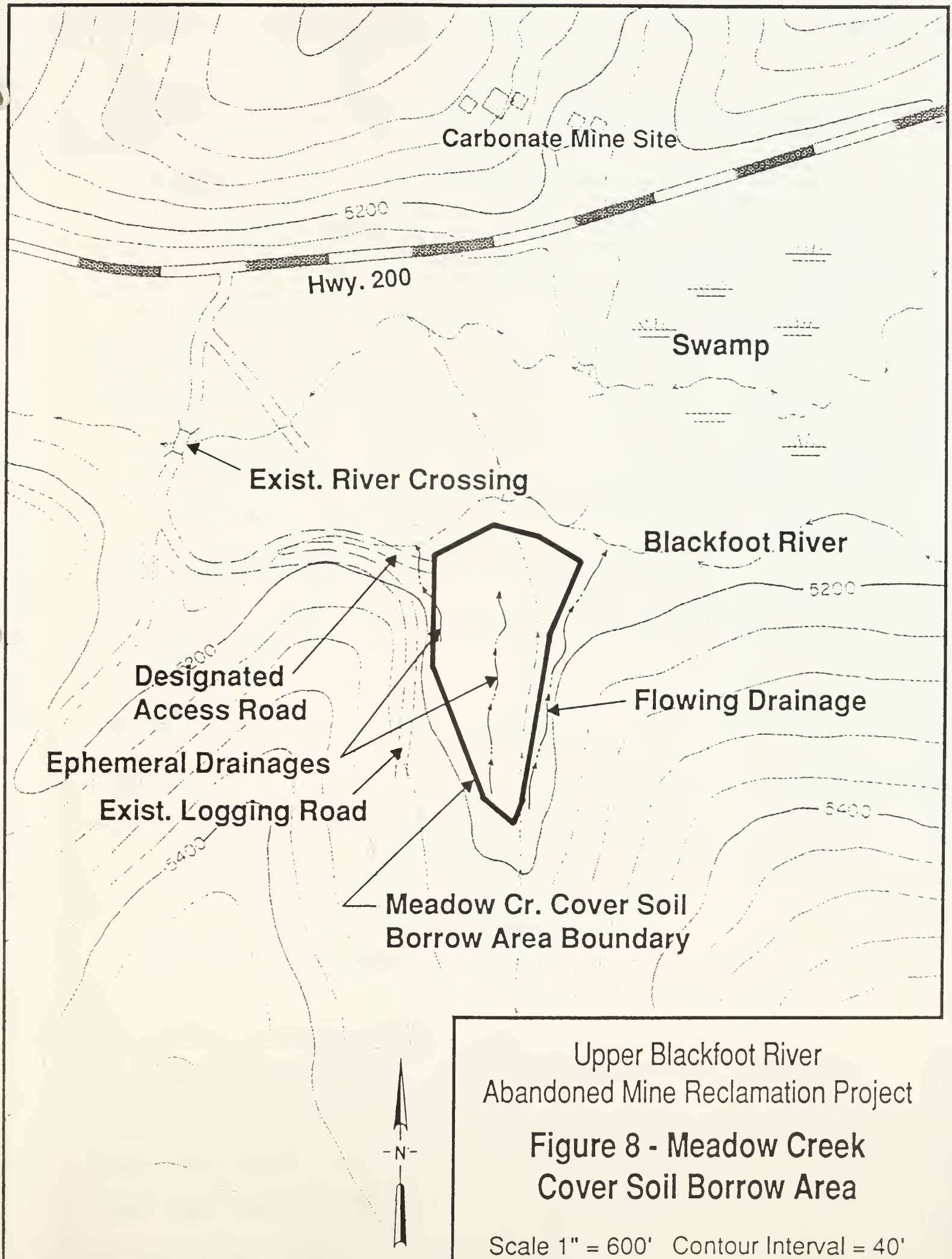
The project area remains undeveloped. Since the project area is bordered by the Helena National Forest, domestic dwellings are quite dispersed. The nearest residential dwelling is approximately one mile from the nearest mine site proposed for reclamation. The nearest developed community is the town of Lincoln, 15 miles to the west.

Since the individual mines have not been in production since the late 1950's, economic benefits are not generated by their existence. Reclamation of the mine-disturbed sites does not preclude future prospecting by those holding the mineral rights.

10. Conformance with Federal, State, regional, and/or local land use plans, programs, and policies

Several Federal, State, regional and local agencies were provided with preliminary proposed reclamation plans and maps for the Upper Blackfoot Project area, Phase I. The agencies were requested to review the proposed actions concerning the project site and surrounding region, and provide specific comments relative to their authority. Agency response letters are presented in Appendix C.

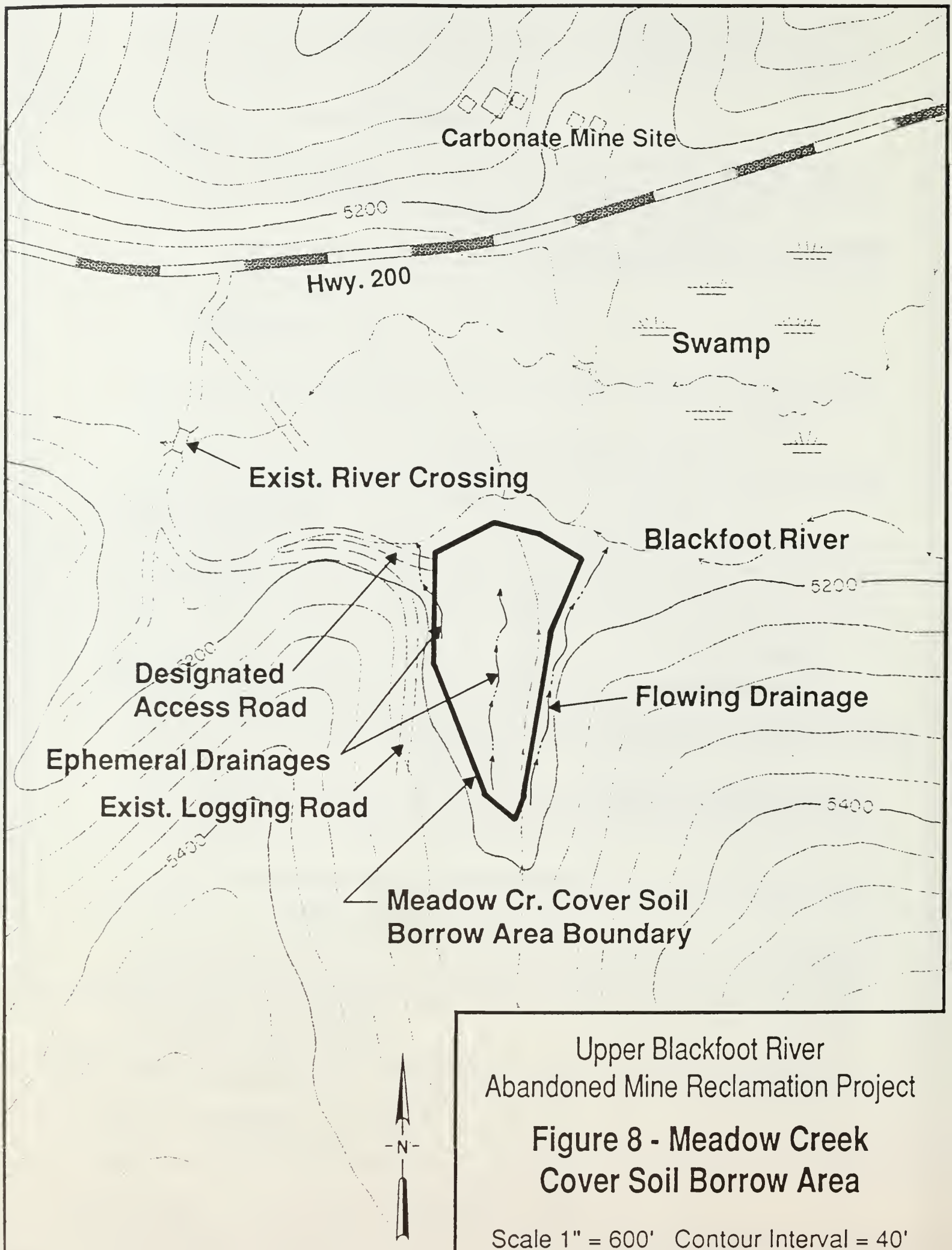
Two different land use plans are in effect either for the immediate project area, or the surrounding vicinity: the Forest Plan adopted by the Helena National Forest, and the Lewis and Clark



Upper Blackfoot River
Abandoned Mine Reclamation Project

Figure 8 - Meadow Creek Cover Soil Borrow Area

Scale 1" = 600' Contour Interval = 40'



Upper Blackfoot River
Abandoned Mine Reclamation Project

Figure 8 - Meadow Creek Cover Soil Borrow Area

Scale 1" = 600' Contour Interval = 40'

Comprehensive Plan. Although the project is not on Forest Service land, it is important that reclamation be plan compatible with proposed land uses of surrounding Federal lands, and in accordance with county plans.

The 1986 Forest Plan has three land use classifications for surrounding lands. Adjacent to the project area, land use is classified as"nonforested and forested land where most resource development is uneconomical or infeasible..." The land area will remain essentially unchanged by resource development, other than investment needed to protect basic soil, water and wildlife resources." Forest Service land to the west is classified as productive forest land, likely scheduled for timber management activities. To the east, land includes important spring, summer and fall wildlife habitat, with livestock grazing allotments. Wildlife habitat should be maintained or enhanced. Timber should only be harvested as a tool to enhance wildlife habitat, and dispersed recreation may be both motorized and nonmotorized.

The following objectives of the Lewis and Clark County Comprehensive Plan may be applicable to the project area:

- encourage protection of wetlands and wildlife habitats (intended to apply to residential developments).

- promote a healthy environment within the county.

- promote proper land uses to provide parks and recreational multi-uses.

The comprehensive county plan primarily applies to incorporated and unincorporated cities and towns, although reclamation activities would meet the applicable objectives of the plan

C. Other Affected Resources

11. Mine soils

Soils in the immediate project area have been degraded by extensive mining activities over the past 100 years. Mine spoils consisting of mining waste rock and mill tailings are deposited over approximately 15.1 acres of the project area. These spoils have contaminated site surface soils with elevated levels of metals and acidity. The phytotoxic nature of these spoils effectively deter plant growth which allows for increased erosion rates. Spoils at all sites have concentrations of leachable heavy metals which exceed RCRA-TCLP (Toxicity Characteristic Leaching Procedure) regulatory limits for a hazardous material. Analyses of mine spoils and soils sampled on site are summarized in Appendix A.

12. Vegetation

Individual mine sites currently have mining disturbed soils which have been unable to revegetate naturally.

Vegetation on the lower ridge slopes of the project area is open Douglas fir and lodgepole pine. The understory is commonly pinegrass, huckleberry and bluebunch wheatgrass (Dollhopf, et al., 1988).

Wetland vegetation is primarily sedges with associated shrubs and lodgepole pine.

13. Fish and wildlife

Although a site specific wildlife inventory has not been conducted for the project area, species known to inhabit the region surrounding the project include: elk, moose, mule deer, black bear, mountain lion, lynx, bobcat, wolverine, and grouse. Bighorn sheep, mountain goats and grizzly bears have also been sighted in the Helena National Forest next to the project area (Helena National Forest EIS, 1986).

The Blackfoot River and its headwater tributaries in the project area support reduced fisheries due to toxic concentrations of heavy metals on-site (Spence, 1975; Ingman, et al, 1990). Outside the immediate toxic impacts of mine drainage, the stream reach more than 15 miles below the project area near Lincoln is known to support a substantial fisheries rating. Brown trout and mountain white fish are common in this reach of the river. Reductions in cutthroat and brown trout in and downstream of the project area were observed from 1973 to 1988, suggesting limited recovery from toxic heavy metal contamination resulting from the Mike Horse tailings pond dam failure (Moore, 1990).

14. Air quality

No air quality monitoring has been done in the immediate project area, although air pollution levels can be assumed to be low and well within ambient air quality standards. This is due to the lack of significant air pollutant sources in the area. Existing sources include vehicle traffic/road dust, wood-burning and mining activities. The project area is designated as Class II under the Prevention of Significant Deterioration (PSD) classification system. The nearest Class I area is the Scapegoat Wilderness located 9 miles to the northwest.

The project area is on the west side of the Continental Divide and is therefore influenced by Pacific weather patterns more than by the continental climate in the region east of the Divide. Mean annual precipitation is approximately 29 inches, much of which occurs as snow. Record maximum and minimum annual precipitation at the Lincoln Ranger Station are 36.02 and 12.26 inches, respectively. Average January and July temperatures are 19.1 and 61.8 degrees Fahrenheit, respectively.

15. Transportation

Transportation systems which access the Upper Blackfoot Phase I project area include U.S. Highway 200 and unnamed dirt roads constructed for mineral development purposes. Highway 200 is heavily traveled, as it is the main route between Missoula and Great Falls. Highway 279 intersects Highway 200 approximately 6 miles southwest of the project area. Highway 279 is the primary route between Helena and Lincoln, although it does not pass through the project area.

Three bridges exist in the project are. All bridges are located off Highway 200, and provide access to mine sites.

CHAPTER IV. ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

It was determined in Chapter III that the following critical elements would be omitted from analysis of environmental consequences of the alternatives: Cultural, paleontological, or historic resource values; Floodplain/unstable geology concerns; Threatened or endangered plant/animal species; and Migratory birds of higher Federal interest.

Direct and indirect impacts are discussed for each alternative in this section, while cumulative impacts are presented in Section C. of this chapter.

A. Critical Elements

1. Water quality/supply values

Project descriptions and site maps were submitted to the following agencies for review and comment:

- Water Quality Bureau, Department of Health and Environmental Sciences
- Fisheries Division, Department of Fish, Wildlife and Parks
- Dam Safety Bureau, Department of Natural Resources and Conservation

Mr. Fred Shewman of the Water Quality Bureau (MDHES) stated that the following directives apply for each of the action alternatives (1, 3, and 4):

- sediment basins installed for construction activities will require at least a temporary discharge permit (3A authorization)
- wetland treatment systems will not require long term discharge permits

Losses or reductions in productivity associated with the action alternatives would not occur.

Mr. Mark Peterson (Dam Safety Bureau, DNRC) specified that dam impoundments with a hydraulic capacity of 50 acre-feet or more would require a high hazard classification request. Sediment basin holding capabilities for any of the action alternatives would be substantially less that 50 acre-feet. As a result, a high hazard classification request for dams utilized in action alternatives would not be required.

A written directive was issued by the Department of Fish Wildlife and Parks indicating that the Stream Protection Act would apply to construction activities in the project area (Crest, January 1991). The reclamation work for any of the action alternatives would required a 124 Permit to comply with this act.

ALTERNATIVE 1:

It was determined in Chapter III.B.1 that surface water quality within and downstream of the project area has been seriously degraded by previous mining activities. Degradation has resulted from heavy metal contamination, high acidity, and sediment suspension from soil erosion.

Mine spoils at the sites (excluding the Carbonate site) would be graded into on-site (either in place or centralized) deposition areas, or used to construct wetland lagoons. On-site deposition would include lime treatment, coversoiling and revegetation. Water would be isolated from contact with compacted lagoon soils by a sealing system consisting of a bentonite seal and membrane liner. The fine-grained Carbonate mine tailings would be isolated with a synthetic membrane liner and bentonite seal. These procedures would prevent surface water from contacting or transporting spoils.

Steep slopes and denuded soils on the project site would be graded to a stabilized slope, lime neutralized, cover soiled and revegetated. Excessively steep slopes at the upper Mike Horse area would be similarly reclaimed, except for coversoiling. Substantially reduced soil erosion would result from grading and revegetation, thus lowering suspended solid particulate concentrations to receiving waters.

All mine drainage would be collected to prevent further contact with spoil material, then routed through constructed wetlands facilitating passive treatment. The Anaconda site wetland would include an anoxic limestone trench to further neutralize acidity, further improving treatment system efficiency. Wetland systems are expected to enhance the quality of acidic waters through removal of some metals. A limestone treatment pond would be installed at the Mike Horse site to provide treatment of water flowing through the emergency bypass system.

It is anticipated that the proposed alternative would eventually reduce concentrations of heavy metals, acidity and suspended solids to surface water.

Implementation of Alternative 1 would require the use of heavy construction equipment with the result of indirect impacts to water quality. Heavy construction activities, by nature, tend to increase soil erosion potentials during the construction period. It is expected that implementation of the proposed project will take place during summer and early fall months. Although summer months are usually dry, thunderstorm events can occur. Summer thunderstorm events are typically short in duration yet relatively high in precipitation. The sediment basin system is intended to facilitate removal of sediments in surface runoff related to thunderstorm events during the construction process.

ALTERNATIVE 2:

Under the No Action alternative, surface water quality within and downstream of the project site would remain in its degraded condition as a result of water contacting spoil piles and acid mine drainage. It is possible that water quality, both on and off site, may continue to degrade.

ALTERNATIVE 3:

Alternative 3 would have environmental consequences on water quality similar to the Proposed Action with the following exception. Under this alternative, acidic mine drainage emanating from the Anaconda and Mike Horse mine adits would not receive treatment either by constructed wetlands or a limestone treatment trench. Mine drainage water acidity and heavy metal concentrations would continue to degrade conditions in the Blackfoot River as well as its headwater tributaries and adjacent wetlands. Reducing contact between water and spoils would slightly improve existing water quality. Therefore, the impact of this alternative at the Mike Horse and Anaconda mines would improve current water quality degradation, but not to the extent that constructed wetland water treatment would as discussed in the Proposed Action (Alternative 1).

Alternative 3 would also omit reclamation at the Edith and Mary P. mine sites. Spoil piles at these sites would not be properly reclaimed, thus leaving them exposed to wind and water erosion and continuing to facilitate water quality degradation.

Under this alternative, the Carbonate mine tailings would not be isolated with a bentonite seal and synthetic membrane liner. The absence of this isolation system would increase the probability of water/tailings contact. Lime neutralization would reduce water degradation potentials, but not as completely as an isolation system. Therefore, the impact of this alternative at the Carbonate mine would slightly increase the potential of water quality degradation compared to the Proposed Action.

Implementation of Alternative 3 would require the use of heavy construction equipment, and have indirect impacts related to construction activities identified in Alternative 1. Construction impacts associated with Alternative 3 would be less due to the lesser amount of construction activities.

ALTERNATIVE 4:

Under this alternative, the upper shaft area at the Carbonate site, the north, north-east and downstream spoils piles at the Anaconda site, and the upper spoils piles at the Mike Horse site would not be reclaimed. Alternative 4 would also omit reclamation at the Edith and Mary P. mine sites. Since spoil piles at these project sites would not be reclaimed, exposure to wind and water erosion would continue to facilitate water quality degradation.

Alternative 4 would facilitate improved water quality associated with wetland treatment, and reclaimed spoils (with the exceptions stated in the above paragraph) as identified under Alternative 1. Overall, water quality would likely improve, but not to the degree as in Alternative 1. Alternative 4 would likely improve water quality greater than Alternative 3. Water degrading potentials associated with unreclaimed spoils would remain.

Implementation of Alternative 4 would also have indirect impacts associated with the use of heavy construction equipment as identified in Alternatives 1, and 3. Alternative 4 construction impacts would be less than Alternatives 1 or 3 due to the lesser amount of construction activity required.

2. Wetland values

Wetlands were found on and around the project area and are described in Chapter III. Project descriptions and site maps were submitted to the U.S. Army Corps of Engineers for review and comment. Although not known until permit application, it is anticipated that the proposed work under all action alternatives would be eligible for a "nationwide or regional" permit under Section 404 of the Clean Water Act (McInerney, 1991).

ALTERNATIVE 1:

As a result of the positive impacts Alternative 1 would have on water quality, it is expected that overall quality of area and downstream wetlands would improve. By reducing heavy metal, sediment and acid concentrations, water quality of wetlands adjacent to the Blackfoot River would be expected to increase from its current degraded state. Increased water quality may indirectly enhance the health and diversity of organisms inhabiting or frequenting the wetland systems.

ALTERNATIVE 2:

Since the No Action alternative would not facilitate the improvement of water quality, it is expected that area wetlands would remain in their present degraded condition as described in Chapter II.

ALTERNATIVE 3:

Elimination of constructed wetland and limestone treatment systems would cause acidity and metal concentrations of mine drainage water to remain high. As a result, continued degradation of surface water quality and thus existing natural wetland systems would occur.

Furthermore, the mill tailings at the Carbonate site would be lime neutralized only, as opposed to isolation by a bentonite/ synthetic membrane seal. This may indirectly add to degraded conditions in downgradient wetlands, as there would still be the potential of water/spoils contact and runoff migration of the tailings.

Techniques proposed for reclamation of mine spoils under this alternative would decrease the potential for contact with water and wind. Although some project area spoils would remain, the overall degradation potential associated with exposed mine spoils would decrease. This could indirectly enhance the possibility of wetland quality improvement.

ALTERNATIVE 4:

Under this alternative, some spoils at the Carbonate, Anaconda and Mike Horse mine sites, and all spoils at the Edith and Mary P. mine sites would not be reclaimed. Unreclaimed spoils would continued to be exposed to wind and water erosion, thus potentially adding to surface water quality and natural wetland degradation.

3. Renewable resources/unique farmland values

IMPACTS COMMON TO ALTERNATIVES 1, 3, AND 4:

Removal of coversoil from the Meadow Creek borrow site would decrease soil thickness and cause temporary site disturbances from construction activities. Prior to excavation of borrow material, topsoil would be stockpiled. Upon completion of excavation, the borrow site would be graded to match natural contours, covered with stockpiled topsoil and revegetated. Removing coversoil from this borrow site does not impact prime or unique farmland, or agricultural land which produces food or fiber products.

ALTERNATIVE 1:

Alternative 1 would not impact the Meadow Creek borrow area.

4. Recreational resource value

Project descriptions and site maps were submitted to the following agencies for review and comment:

- Helena National Forest
- Bureau of Land Management

Based upon the preliminary description of the Upper Blackfoot reclamation project, the forest plan concerning nearby Forest Services lands will not be affected (Turner, 1991). However, final project approval by the Helena National Forest Service will be based upon final project design.

ALTERNATIVE 1:

The existing hazards to public safety (open mine shafts and adits, exposed tailing piles, and aging mine-related structures) would all be reduced or eliminated under Alternative 1. This alternative would facilitate the proper deposition, stabilization, neutralization and/or isolation of mine spoils, closing of open mine shafts and adits, and demolition of potentially dangerous mine-related structures.

Proposed project actions which would enhance water quality and vegetative cover of the project site would also indirectly increase the recreational resource potential of the project area. Enhanced water quality and vegetative cover would improve aquatic and wildlife habitat, as well as improve the aesthetic features of the immediate project and surrounding vicinity.

By reducing health and safety threats to humans, enhancing the visual quality, and improving plant and wildlife habitats, the project area and surrounding vicinity would benefit in terms of recreational resource potentials.

Implementation of the Proposed Action would require a short duration of construction activity, likely between May and October of 1991. Site access would be temporarily restricted to the general public for safety purposes during the period of construction.

ALTERNATIVE 2:

The No Action alternative would result in unchanged recreational resource values. Current site conditions obstruct safe recreational use of the immediate project area, and detract from the aesthetic value of the surrounding undisturbed vicinity.

IMPACTS COMMON TO ALTERNATIVES 3 AND 4:

Alternatives 3 and 4 may not facilitate the enhancement of surface water and vegetative quality as effectively as the Proposed Action. As a result, area wetlands, the Blackfoot River and immediate project area may not be as productive in terms of fish and wildlife, thus indirectly detracting from the potential recreational value of the project area.

Implementation of these alternatives would similarly require a short duration of construction activity, likely between May and October of 1991. Site access would be restricted to the public for safety purposes during the construction phase, temporarily reducing the recreational value of the project area.

5. Social and economic values

IMPACTS COMMON TO ALTERNATIVES 1, 3, AND 4:

These alternatives are expected to cost between $503,112 and $786,335 to implement (including other grant funding). Dollars associated with construction of the alternatives would be spent on labor, materials, and project management. Construction of the alternatives would create jobs for individuals employed in the construction industry. Local businesses supplying materials or services for the project may economically benefit.

Since the Upper Blackfoot Project mines have not been in operation since the late 1950's, loss of employment and mine revenues would not occur as a result of implementing the alternatives. Additionally, implementing the alternatives would not preclude future mining opportunities on the project sites.

ALTERNATIVE 2: NO ACTION

Under the No Action alternative, social and economic values would remain as described in Chapter III.B.9.

6. Conformance with Federal, State, regional and/or local land use plans, programs and policies

Several Federal, State, regional and local agencies were provided with reclamation plans and maps for the Upper Blackfoot Phase I mine sites. Each agency was requested to review the proposed actions in relation to the project site and surrounding region, and provide specific comments concerning their jurisdictional authority. Agency response letters are presented in Appendix C. Below, agency responses not identified under previous critical elements are summarized according to land use plans, policies in effect, and specific permits which will likely be required.

Land Use Plans: All action alternatives would be in compliance with pertinent land use plans identified in Chapter III.B.10 (the Helena National Forest Plan, and the Lewis and Clark County Comprehensive Plan)

Policies Affecting the Project Area: The construction contractor will be required to comply with all applicable Occupational Health and Safety Administration (OSHA) requirements, as well as U.S. Forest Service regulations and federal, state, and local laws. A weed management plan would be approved before construction begins.

Permits Likely to be required: Burning permit, 3A authorization, 124 permit, 404 permit.

IMPACTS COMMON TO ALTERNATIVES 1, 3, AND 4:

Applicable and/or Relevant and Appropriate Requirements necessary for the implementation of these action alternative are summarized in critical element analyses and the above paragraph, while agency directives are presented in Appendix C.

ALTERNATIVE 2: NO ACTION

Conformance with federal, state, regional and/or local land use plan, programs and policies would not be necessary under the No Action alternative.

B. Other Affected Resources

7. Mine soils

In Chapter III mine soils/spoils were identified. Both the MDHES, Solid and Hazardous Waste Bureau (SWHB) and the Montana Office of the U.S. Environmental Protection Agency (EPA) were provided with preliminary plans and maps for the Upper Blackfoot mine sites. Agencies were requested to review the proposed actions in relation to the project site and surrounding region, and provide specific comments relative to their authority.

The EPA directed that proposed activities follow requirements of the National Environmental Policy Act. This directive is being met with through completion of this environmental assessment.

The SWHB requested that project planning be completed in compliance with the National Contingency Plan (NCP). Compliance with the NCP is being achieved through design phase engineering, as well as a public involvement program.

ALTERNATIVE 1:

The Proposed Action alternative would facilitate reclamation of all mine spoils in the Phase I project area. Wetland dikes and lagoon systems would be constructed of spoils from the central Anaconda and Mike Horse mine sites. To accommodate wetland design, some spoils from the Anaconda site would be used as fill at the Mike Horse site. As these materials are chemically very similar (Anaconda spoils actually have lower leaching capability) no adverse impact is expected. Wetland waters would be systematically isolated from spoils, while outer dikes would be lime neutralized, coversoiled and revegetated.

Central Carbonate mill tailings would be isolated in an on-site deposition area. The tailings would be underlain by a limestone veneer layer, sealed with a bentonite/synthetic membrane liner, coversoiled and revegetated.

Spoil materials at the Edith, Mary P. and adjoining Anaconda and Carbonate mine sites (north, north east and downstream, and upper shaft areas respectively) will be reclaimed on site. Reclamation includes grading, lime-neutralization, coversoiling and revegetation. The upper Mike Horse spoils area will be lime-neutralized and revegetated, while only the more gentle slopes would be coversoiled. Steeper slopes would be lime-neutralized and reforested with evergreen seedlings.

Areas previously serving as mine spoils deposition sites will be graded, lime-neutralized, coversoiled and revegetated. Site grading would attempt to match existing ground contours.

Implementing the Proposed Action alternative would significantly enhance project area soil conditions. As previously stated, improved soil conditions would indirectly benefit vegetation, water, and wetland conditions.

ALTERNATIVE 2:

Under the No Action alternative, soil conditions would remain unchanged from their present condition.

ALTERNATIVE 3:

Alternative 3 would have beneficial soils impacts similar to Alternative 1 with the following exceptions: the Edith and Mary P. mine spoils would not be reclaimed; the Carbonate tailings would be lime-neutralized (not isolated); and central Mike Horse and Anaconda Spoils would all be lime-neutralized, instead of isolated. Project area soils would all be improved from existing conditions except at the Edith and Mary P. sites.

Spoils at the Edith and Mary P. sites would continue to be exposed to the elements and devoid of vegetation.

Under this alternative, the fine-grained Carbonate tailings would be lime neutralized, coversoiled and revegetated, but would not be isolated. The absence of the bentonite liner/synthetic membrane system reduces the isolation factor between water and mill tailings. Soil conditions would be improved from existing ones, although minor environmental degradation potential would remain.

Similarly, spoils at the Mike Horse and Anaconda sites would not be isolated with a bentonite and synthetic liner system, as wetlands would not be constructed. Under this alternative, spoils would be lime-neutralized, coversoiled and revegetated.

Reducing potential contact between wind, water and spoils by liming, coversoiling and revegetating would slightly improve existing soil and water quality conditions. Therefore, the result of this alternative at the Carbonate, Mike Horse and Anaconda mines would slightly improve current soil conditions, but not to the extent that spoils isolation would as discussed in the Proposed Action alternative (Alternative 1).

ALTERNATIVE 4:

Implementation of Alternative 4 would preclude reclamation of mine spoils at the following sites: Edith, Mary P.; upper adit area of Carbonate; north, north east and downstream adjoining areas at Anaconda; and the upper area at the Mike Horse mine. Without reclamation, these mine spoils would continue to be exposed to wind and water erosion, remain devoid of vegetation and continue to pose environmental degradation potential to the project area.

8. Vegetation

ALTERNATIVE 1:

As a result of the improved soil conditions listed in Section 7 above (Mine soils), vegetative growth and diversity potentials would be expected to significantly improve from the existing devegetated site condition. Enhancing site vegetation would promote soil stability, and reduce erosion and the

likelihood of noxious weed intrusion. Indirectly, wildlife and aesthetic conditions would be enhanced.

ALTERNATIVE 2: NO ACTION

The No Action alternative would cause site vegetation conditions to remain in the present condition as depicted in Chapter III.C.12.

ALTERNATIVE 3:

As a result of the improved soil conditions listed in Section 7 above (Mine soils), vegetative growth and diversity potentials would be expected to significantly improve at all mine sites excluding Edith and Mary P. Enhancing site vegetation would promote soil stability, and reduce erosion and the likelihood of noxious weed intrusion. Indirectly, wildlife and aesthetic conditions would be enhanced.

Implementation of this alternative would likely improve conditions for wetland. However, since acid mine drainage would not be treated, improved vegetative conditions would be minor in comparison to the Proposed Action which would facilitate acid mine drainage treatment.

ALTERNATIVE 4:

As a result of the improved soil conditions listed in Section 7 above (Mine soils), vegetative growth and diversity potentials would be expected to significantly improve at the central areas of the Carbonate, Anaconda and Mike Horse mine sites. Enhancing site vegetation at these particular sites would promote soil stability, and reduce erosion and likelihood of noxious weed intrusion. Indirectly, wildlife and aesthetic conditions would be enhanced.

Vegetative conditions at the following sites would remain in their present devegetated state: Edith, Mary P.; upper adit area of Carbonate; north, north east and downstream adjoining areas at Anaconda; and the upper area at the Mike Horse mine. Implementation of this alternative would be a major improvement compared to the No Action alternative, but vegetation improvement would not be as great as that associated with Alternatives 1 and 3.

9. Fish and wildlife

The area surrounding all reclamation activities includes bear habitat. The construction contractor and his employees would be required to avoid any bears sighted, store lunch boxes in vehicle cabs, remove all food scraps from the work site on a daily basis, and consolidate all equipment and crew transportation. Further, the contractor and his crew would be prohibited from carrying weapons on or over National Forest lands.

ALTERNATIVE 1:

Implementation of these alternatives would result in increased benefits to fish and wildlife on and around the project site in terms of water quality and vegetative enhancement. Indirectly, the project area would be more desirable to wildlife as a result of implementing the Proposed Action, as the overall wildlife habitat would be expected to improve. Increased surface water quality in the river and adjacent wetlands would likely provide a more suitable environment for aquatic organisms.

Construction activities associated with the Proposed Action alternative may temporarily discourage the use of the immediate project area by wildlife and may increase sediment concentrations to surface waters. However, overall impacts resulting from the Proposed Action alternative would be positive.

ALTERNATIVE 2:

Under this alternative the quantity and diversity of fish and wildlife species would likely remain unchanged due to existing degraded site conditions.

ALTERNATIVE 3:

Implementing Alternative 3 would not facilitate the treatment of acid mine drainage waters. As an indirect result, fish, wildlife and aquatic plants inhabiting or frequenting the upper Blackfoot River and adjacent wetlands may continue to be adversely affected by degraded water quality conditions.

Since vegetative conditions at the Edith and Mary P. sites will not be improved, wildlife frequenting the immediate sites may be adversely affected.

Reclamation at the Carbonate, Anaconda and Mike Horse sites will indirectly improve wildlife habitat by improving soil and vegetative conditions.

Overall, fish and wildlife conditions would improve from existing ones. However, improved conditions would not be as significant as those expected under the Proposed Action alternative.

ALTERNATIVE 4:

Implementation of Alternative 4 would preclude reclamation of mine spoils at the following sites: Edith, Mary P.; upper shaft area of Carbonate; north, north east and downstream adjoining areas at Anaconda; and the upper area at the Mike Horse mine. Without reclamation, these mine spoils would continue to experience erosion by wind and water, remain devoid of vegetation and continue to pose an environmental threat to the project area and the Blackfoot River.

Overall, fish and wildlife conditions in the project area would be improved over their existing state. However, improved conditions would not be as significant as those expected from Alternative 1, and would be less than those identified under Alternative 3.

10. Air quality

The Air Quality Bureau was contacted concerning proposed reclamation activities in the project area. An air quality permit would not be required for any of the reclamation alternatives, as potential emissions are expected to be well below 25 tons per year (Driscoll, January 1991).

IMPACTS COMMON TO ALTERNATIVES 1, 3, AND 4:

Construction activities required to implement the action alternatives would likely increase fugitive dust particle concentrations and vehicle exhaust in the project area. Increased levels of fugitive dust and vehicle emissions would exist for the duration of construction activities (less that three months). Emissions would be localized in the project area.

Alternatives 3 and 4 would have less fugitive dust and exhaust emissions, due to fewer equipment activities required to implement the alternatives.

An air quality permit would not be required for any of the action alternatives because the potential emissions would be less than 25 tons per year. Although a permit would not be needed, air quality regulations do require that reasonable precautions be taken to control fugitive dust. Applying water to haul roads would facilitate reduction of fugitive dust emissions associated with heavy equipment activity.

IMPACTS UNIQUE TO ALTERNATIVE 2:

Air quality conditions would remain unchanged from current conditions in and around the project area.

11. Transportation

IMPACTS COMMON TO ALTERNATIVES 1, 3, AND 4:

Construction of the reclamation action in the above alternatives would require employees to travel to and from the project area. Traffic in the project area would likely increase relative to current conditions. Construction employees traveling to and from the project site daily would insignificantly increase the number of vehicles on Highway 200 and possibly 279. This increase, however, would be temporary and minor in its overall impact on current traffic levels.

Utilization of the Meadow Creek borrow area would temporarily impact existing traffic conditions during construction activities. Equipment hauling cover material from the borrow area would have to cross or enter Highway 200.

Heavy equipment hauling borrow material to the Edith, Mary P., Anaconda and Mike Horse mine sites would have to travel approximately one half mile on Highway 200. Equipment would haul full loads in an easterly direction, and empty loads in the westerly direction. Upon dumping loads, returning equipment would be required to turn against traffic in order to enter the Meadow Creek Borrow site. This would potentially back up west bound traffic, and possibly create a safety hazard. The construction contractor would be required to provide adequate traffic control measures, including flag-men and signing.

Heavy equipment hauling borrow material to the Carbonate mine site would be required to cross Highway 200. As stated earlier, traffic control measures would be employed by the construction contractor to provide traffic safety during project construction.

IMPACTS UNIQUE TO ALTERNATIVE 2:

Traffic conditions would remain unchanged from present conditions in the project area and along Highways 200 and 279, as well as on mine access road corridors.

C. Cumulative Impacts

ALTERNATIVE 1: PROPOSED ACTION

As identified in this and previous chapters, implementation of the Proposed Action alternative would positively benefit the following individual elements in a direct manner on the immediate project site:

- health and safety
- surface water quality
- vegetation
- soil condition and stability

Collectively, these elements would be expected to positively impact the following critical issues and/or elements:

- recreational resource values
- fish and wildlife habitat
- surface water quality off the project site (including the Blackfoot River and adjacent wetlands)

ALTERNATIVE 2: NO ACTION

The No Action alternative would allow further degradation of the project area. In fact, significant cumulative impacts resulting from the No Action alternative are displayed in the existing deteriorated wetland and water quality, soil stability, wildlife habitat and recreational values. Overall public safety and environmental quality would continue to be negatively impacted by the No Action alternative

ALTERNATIVE 3

Alternative 3 would have similar cumulative impacts as the Proposed Action alternative, although the positive cumulative impacts would be less profound. Positive cumulative impacts of Alternative 3 would focus on revegetation of mining disturbed areas, rather than overall reclamation as emphasized under Alternative 1.

ALTERNATIVE 4

Alternative 4 would have similar cumulative impacts as the Proposed Action alternative, although the positive cumulative impacts would be less profound. Positive cumulative impacts of Alternative 4 would focus on water quality improvements, rather than overall reclamation as emphasized under Alternative 1.

D. Mitigation Measures

MITIGATION MEASURES COMMON TO ALTERNATIVES 1, 3, AND 4:

Mitigation measures would be necessary to decrease impacts associated with temporary construction activities.

To reduce short-term (less than three months) negative impacts likely to result from construction activities, the following mitigation measures should be enforced on the project site during construction activities:

1. Apply water to haul roads and graded areas regularly to reduce emission of fugitive dust.
2. Use erosion control devices such as erosion fences, hay bale dikes, sediment control barriers and basins to reduce erosion potentials.
3. Provide traffic control including flag men and adequate signing.
4. Require 'Weed Free Seed' certification for seed used in revegetation processes.
5. Require the construction contractor to observe speed limits on Highway 200.
6. Require the construction contractor to comply with weight limits for Highway 200, county roads, and river crossings.
7. Require the construction contractor would be required to comply with Forest Service regulations concerning burning, operation of motorized equipment, and bear/work crew interactions.
8. Reclaim the Meadow Creek coversoil borrow area.

ALTERNATIVE 2: NO ACTION

Mitigation measures do not apply to the No Action alternative.

E. Unavoidable Adverse Impacts

IMPACTS COMMON TO ALTERNATIVES 1, 3, AND 4:

Reclamation activities would require removal of coversoil from the Meadow Creek borrow area. This action would result in unavoidable adverse impacts, including decreased soil thickness, and temporary construction disturbances. These impacts would be minimized be grading the site upon project completion, replacing stockpiled topsoil, and revegetating the area. The borrow site would be graded to match local contours. Impacts to the Meadow Creek borrow area would be minimal and temporary until vegetation was reestablished (less than three years).

Channel realignment at the Mike Horse mine site may temporarily disturb Beartrap Creek. Disturbance would include increased sedimentation and disruption of the existing, limited creek habitat. Upon completion of channel realignment, the creek is expected to provide positive benefits by providing suitable aquatic habitat.

Negative impacts resulting from implementing the reclamation alternatives may include increased traffic on Highway 200, decreased traffic safety, fugitive dust emission, and temporary restriction of a recreational resource. All of the above-listed unavoidable adverse impacts will be temporary in duration (less than three months), and strictly associated with construction activities.

ALTERNATIVE 2: NO ACTION

Unavoidable adverse impacts associated with reclamation activities do not apply to the No Action alternative.

F. Short-term Uses vs Long-term Productivity

All action alternatives (1, 3, and 4) will require a short-term construction impact (less than three months). Short-term construction impacts would include increased noise pollution, fugitive dust emission, and traffic levels for an approximate duration of less than three months. Construction activities would temporarily restrict recreational usage of the immediate project site. However, implementation of construction activities for the action alternatives would significantly enhance overall long-term productivity of the project site, and possibly the surrounding vicinity. Long-term productivity of the site would be enhanced by implementation of alternatives that would positively benefit the following individual elements on the immediate project site:

- health and safety
- surface water quality
- vegetation
- soil condition and stability

Collectively, these elements would likely improve the following resources:

- recreational resource values
- fish and wildlife habitat
- surface water quality on and off the project site (including the Blackfoot River and adjacent wetlands)

Long-term productivity in terms of reclaimed acreage and improved water quality would be greatest for the Proposed Action alternative.

Concerning long-term land productivity, Alternative 1 would have the greatest results, followed by Alternative 3, and then Alternative 4. The No Action alternative would not lend itself to long-term land productivity.

Long-term productivity concerning water resources would be greatest for Alternative 1, followed by Alternative 4, and then Alternative 3. The No Action alternative would not facilitate productivity of water resources.

Clearly, short-term usage (construction activities) would positively benefit the project site in terms of long-term productivity.

G. Irreversible and Irretrievable Commitments of Resources

COMMITMENTS COMMON TO ALTERNATIVES 1, 3, AND 4:

Removal of soil from the Meadow Creek borrow area may be considered an irretrievable commitment of resources. Although the resource would be removed from the Meadow Creek area, it would merely be displaced to another location, thus considered irretrievable only in terms of the borrow area itself. Sufficient topsoil would remain in the borrow area to allow revegetation. The area would also be graded to match local contours and restore ephemeral drainage patterns.

Energy necessary to construct the reclamation project is identified as a finite, irreversible commitment of petroleum products and electrical power.

Implementing the action alternatives would not preclude future mining opportunities at the mine site.

ALTERNATIVE 2: NO ACTION

Irreversible and irretrievable commitments of resources does not apply to the No Action alternative.

CHAPTER V. CONSULTATION & COORDINATION

A. Persons, Organizations, and Agencies Contacted

Margaret Beer, Data Manager. Natural Resource Information System, Montana State Library, Helena, Montana.

Roddy Bullis, Mineral Forester. U.S. Forest Service, Helena National Forest, Lincoln, Montana.

Ken Chrest, Stream Protection Coordinator. Department of Fish, Wildlife and Parks, Helena, Montana.

Pat Driscoll, Environmental Engineer. Air Quality Bureau, Department of Health and Environmental Sciences, Helena, Montana.

Gary Fischer, Manager. Engineering Bureau, Department of Natural Resources, Helena, Montana.

Dennis Flath, Nongame Biologist. Montana Department of Fish, Wildlife and Parks. Bozeman, Montana.

Denis Hart, District Ranger. Helena Ranger District, U.S. Department of Agriculture, Helena, Montana.

Katherine Huppe, Historical Survey Reviewer. Montana Historical Society, Helena, Montana

Warren Kellogg, District Conservationist. Soil Conservation Service, U.S. Department of Agriculture, Helena, Montana.

Larry Laing, Soil Scientist. US Forest Service, Helena National Forest, Helena, Montana.

Peter Langen, Data Base Technician. Natural Resource Information System, Montana State Library, Helena, Montana.

Bob McInerney, U.S. Army Corps of Engineers, Helena, Montana.

Kemper McMaster, Field Supervisor. Fish and Wildlife Service, U.S. Department of Agriculture, Helena, Montana

Larry Pederman, Fisheries Biologist. Montana Fish, Wildlife and Parks, Helena, Montana.

Mark Peterson, Dam Safety Engineer. Dam Safety Section, Department of Natural Resources and Conservation, Helena, Montana.

Fred Shewman, Permits Section Manager. Water Quality Bureau, Department of Health and Environmental Sciences, Helena, Montana.

Bo Stuart, Forest Hydrologist. US Forest Service, Helena National Forest, Helena, Montana.

Jack Thomas, Environmental Specialist. Water Quality Bureau, Department of Health and Environmental Sciences, Helena, Montana.

Steve Tralles, Environmental Specialist. Water Quality Bureau, Department of Health and Environmental Sciences, Helena, Montana.

Dave Turner, Minerals Specialist. US Forest Service, Helena National Forest, Helena, Montana.

John Wardell, Montana Director. Region VIII, U.S. Environmental Protection Agency, Helena, Montana.

B. Preparers and Reviewers

Stuart Levit, Reclamation Specialist, Abandoned Mine Reclamation Bureau, Department of State Lands

Robert B. Morton, Reclamation Scientist, Robert Peccia and Associates, Helena, Montana

Susie M. Smith, Environmental Engineer, Robert Peccia and Associates, Helena, Montana

C. Cooperators

The Upper Blackfoot Project is uncommon in its cooperators. Additional cooperators include the following: Trout Unlimited, Lincoln Ranger District - Helena National Forest, ASARCO, Montana Department of Health and Environmental Sciences - Water Quality Bureau, Montana Department of Fish, Wildlife and Parks, Clark Fork Coalition, and the Montana Environmental Information Council.

Currently the project is administered by the Montana Department of Natural Resources and Conservation; Montana Department of State Lands, Abandoned Mine Reclamation Bureau; and the Lewis and Clark County Conservation District with the lead agency being the Department of State Lands, Abandoned Mine Reclamation Bureau.

CHAPTER VI. REFERENCES

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CHAPTER VII. APPENDICES

APPENDIX A.

UPPER BLACKFOOT RIVER SOIL AND WATER QUALITY

UPPER BLACKFOOT MINES
Water Analysis

Parameter (mg/l)	Drinking Water Std.	Anaconda 6-25-90	Anaconda 11-16-90	Beartrap Cr. Above Anaconda 11-16-90	Anaconda Cr. Befor Beartrap 11-16-90	Mike Horse 6-25-90
pH (s.u.)		3.100	3.600	6.900	7.200	5.800
Spec Cond @ 25 C, umhos/cm		1260.000	694.000	687.000	169.000	1840.000
Acidity		7360.000	62.000	21.000	85.000	5630.000
Sulfate	250.000#	483.000	307.000	319.000	8.000	1170.000
Total Alkalinity as CaCO3		0.000				16.000
Total Hardness as CaCO3						
METALS:						
Aluminum		5.330	1.610	<0.100	<0.100	1.200
Arsenic	0.050*	0.042	0.008	<0.005	<0.005	0.015
Cadmium	0.010*	0.025	0.010	0.012	<0.001	0.167
Calcium						
Copper	1.000#	4.210	0.550	0.010	<0.010	2.220
Iron	0.300#	40.600	23.600	4.140	<0.030	13.700
Lead	0.050*	0.370	0.010	<0.010	<0.010	0.070
Magnesium						
Manganese	0.050#	12.900	7.190	4.900	<0.020	25.700
Mercury	0.002*					
Sodium	20.000@					
Thallium		<0.100				<0.100
Zinc	5.000#	4.730	1.500	8.100	0.030	56.600

Parameter (mg/l)	Mike Horse M. Adit 11-15-90	Mike Horse Mine Adit 7-23-87	Above Mike-A 11-15-90	Upper Mike Seep 11-15-90	Mike Horse Lower Seep 11-15-90	Below M.H. @ Culvert 11-15-90
pH (s.u.)	5.900	6.200	7.500	7.100	6.500	6.300
Spec Cond @ 25 C, umhos/cm	2260.000	1200.000	204.000	205.000	518.000	1680.000
Acidity	164.000				27.000	73.000
Sulfate	1570.000	668.000	13.000	15.000	249.000	1080.000
Total Alkalinity as CaCO3		64.000	101.000	94.000		
Total Hardness as CaCO3		673.000				
METALS:						
Aluminum	<0.100		<0.100	<0.100	0.500	<0.100
Arsenic	0.017	<0.005	<0.005	<0.005	<0.005	0.005
Cadmium	0.042	0.066	<0.001	0.002	0.047	0.046
Calcium		123.000				
Copper	0.150	0.480	<0.010	<0.010	0.140	0.110
Iron	53.600	8.840	<0.030	0.050	0.600	27.300
Lead	0.090	<0.010	<0.010	0.010	0.030	0.090
Magnesium		89.000				
Manganese	37.400	14.500	<0.020	<0.020	0.870	23.700
Mercury		<0.001				
Sodium		<1.000				
Thallium						
Zinc	50.400	27.100	0.020	0.340	10.700	36.800

Parameter (mg/l)	Mike Horse Cr. Near Spring 7-23-87	Mike Horse Cr. Below Adit 7-23-87	No Telm Cr. @ Culvert 11-16-90	Blacktail Cr. Below Dam 7-23-87	Blackfoot River Below Ana. Mine 7-23-87	Blackfoot River At Bridge 7-23-87
pH (s.u.)	7.800	6.600	4.700	7.400	7.300	7.300
Spec Cond @ 25 C, umhos/cm	186.000	747.000	163.000	398.000	281.000	273.000
Acidity			25.000			
Sulfate	8.000	354.000	75.000	127.000	67.000	69.000
Total Alkalinity as CaCO3	94.000	70.000		75.000	76.000	70.000
Total Hardness as CaCO3	108.000	406.000		210.000	149.000	145.000
METALS:						
Aluminum			2.300			
Arsenic	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium	<0.001	0.046	0.002	0.018	0.007	0.005
Calcium	24.000	77.000		41.000	31.000	31.000
Copper	<0.010	0.320	0.310	0.080	0.020	0.030
Iron	<0.030	4.390	0.820	0.590	0.150	0.120
Lead	<0.010	<0.010	<0.010	0.020	<0.010	<0.010
Magnesium	12.000	52.000		26.000	17.000	17.000
Manganese	<0.020	7.280	0.730	1.190	0.410	0.330
Mercury	<0.001	<0.001		<0.001	<0.001	<0.001
Sodium	<1.000	<1.000		<1.000	<1.000	<1.000
Thallium						
Zinc	0.360	15.300	0.370	3.770	1.290	1.120

* Primary Drinking Water Standards
\# Secondary Drinking Water Standards
@ Health Advisory

UPPER BLACKFOOT MINES
Toxicity Characteristics Leaching Procedure
Waste Analysis

Carbonate Waste
6-25-90

Metals	Regulatory Level, mg/l	Detection Limit, mg/l	in Extract mg/l
Arsenic	5.00	0.50	<0.50
Barium	100.00	10.00	<10.00
Cadmium	1.00	0.10	<0.10
Chromium	5.00	0.50	<0.50
Lead	5.00	0.50	38.00
Mercury	0.20	0.02	<0.02
Selenium	1.00	0.10	<0.10
Silver	5.00	0.50	<0.50

Mike Horse Composite #1
6-25-90

Metals	Regulatory Level, mg/l	Detection Limit, mg/l	in Extract mg/l
Arsenic	5.00	0.50	<0.50
Barium	100.00	10.00	<10.00
Cadmium	1.00	0.10	0.70
Chromium	5.00	0.50	<0.50
Lead	5.00	0.50	110.00
Mercury	0.20	0.02	<0.02
Selenium	1.00	0.10	<0.10
Silver	5.00	0.50	<0.50

Mike Horse Composite #2
6-25-90

Metals	Regulatory Level, mg/l	Detection Limit, mg/l	in Extract mg/l
Arsenic	5.00	0.50	<0.50
Barium	100.00	10.00	<10.00
Cadmium	1.00	0.10	0.70
Chromium	5.00	0.50	<0.50
Lead	5.00	0.50	110.00
Mercury	0.20	0.02	<0.02
Selenium	1.00	0.10	0.10
Silver	5.00	0.50	<0.50

Mike Horse Composite #3
6-25-90

Metals	Regulatory Level, mg/l	Detection Limit, mg/l	in Extract mg/l
Arsenic	5.00	0.50	<0.50
Barium	100.00	10.00	<10.00
Cadmium	1.00	0.10	<0.10
Chromium	5.00	0.50	<0.50
Lead	5.00	0.50	64.00
Mercury	0.20	0.02	<0.02
Selenium	1.00	0.10	0.10
Silver	5.00	0.50	<0.50

Anaconda Composite #1
6-25-90

Metals	Regulatory Level, mg/l	Detection Limit, mg/l	in Extract mg/l
Arsenic	5.00	0.50	<0.50
Barium	100.00	10.00	<10.00
Cadmium	1.00	0.10	<0.10
Chromium	5.00	0.50	<0.50
Lead	5.00	0.50	<0.50
Mercury	0.20	0.02	<0.02
Selenium	1.00	0.10	0.10
Silver	5.00	0.50	<0.50

UPPER BLACKFOOT MINES
Soil Analysis

Parameter	Carbonate Waste 17232 6-25-90	Upper Carbonate WR C-2 34023 11-16-90	Carbonate WR C-1 34024 11-16-90	Anaconda Comp. #1 17233 6-25-90	Anaconda C-1 34027 11-15-90	Anaconda C-2 34028 11-15-90	Anaconda C-3 34029 11-15-90	N E Anaconda C-1 34025 11-16-90	N Anaconda C-1 34026 11-16-90	Anaconda E DUP 34030 11-16-90	Anaconda E DUP 34030DUP 11-16-90
pH (s.u.)	1.90	3.00	2.50	2.70	6.80	2.90	2.00	2.40	2.10	2.80	2.80
Cond. (mmhos/cm)	6.33	3.65	4.01	3.17	3.56	5.20	5.85	4.57	7.08	4.31	4.46
Lime Requirement (1)	20.50	14.00	18.00	15.00	<.10	14.00	19.00	16.00	20.00	9.00	9.00
Total Sulfur, %	2.11	1.59	1.22	2.26	1.81	2.33	3.49	2.22	3.22	2.18	2.20
Hot H2O Ext Sulfur %	0.52	0.48	0.13	0.67	0.25	0.90	1.20	0.72	0.80	0.94	0.97
HCL Ext Sulfur, %	0.45	0.52	0.54	1.11	<.01	0.64	1.38	0.87	<.01	0.54	0.50
HNO3 Ext Sulfur, %	0.86	0.36	0.47	0.43	1.41	0.71	0.83	0.60	2.34	0.57	0.62
Residual Sulfur, %	0.28	0.23	0.08	0.05	0.15	0.08	0.08	0.03	0.08	0.13	0.11
Nitrate as N, ug/g	<1.00			<1.00							
Phosphorus, ug/g	2.00			1.50							
Potassium, ug/g	36.00			40.00							
Lime as CaCO3, %	<.10	<.10	<.10	<.10	4.90	<.10	<.10	<.10	<.10	<.10	<.10
Neut. Pot. (2)	<1.00	<1.00	<1.00	<1.00	49.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Acid Pot., meq/100g	99.00	69.00	68.00	99.00	98.00	89.00	143.00	94.00	151.00	78.00	77.00
Acid-Base Pot. (2)	-50.00	-35.00	-34.00	-50.00	0.00	-45.00	-72.00	-47.00	-76.00	-39.00	-38.00
EPA METHOD 3050											
TOTAL METALS, ug/g:											
Aluminum	5280.00	3810.00	8440.00	9050.00	8540.00	4080.00	1230.00	4440.00	4240.00	1340.00	1380.00
Arsenic	141.00	64.00	145.00	155.00	171.00	135.00	163.00	213.00	122.00	253.00	207.00
Barium		28.00	66.00		64.00	63.00	48.00	132.00	135.00	71.00	77.00
Cadmium	<10.00	<5.00	<5.00	<10.00	31.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Chromium	<10.00	<5.00	<5.00	<10.00	10.00	8.00	<5.00	<5.00	<5.00	<5.00	<5.00
Copper		558.00	500.00		220.00	467.00	1160.00	577.00	706.00	1560.00	1100.00
Gold		<5.00	<5.00		9.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Iron		51300.00	69600.00		78100.00	84200.00	58400.00	76500.00	63100.00	57900.00	49900.00
Lead		10900.00	4680.00	2340.00	4570.00	2260.00	8390.00	7000.00	1340.00	11900.00	9430.00
Manganese	13600.00										
Mercury	<10.00			<10.00							
Silver	19.00	38.00	6.00	19.00	8.00	53.00	276.00	109.00	45.00	86.00	56.00
Zinc		279.00	495.00		5180.00	142.00	82.00	302.00	90.00	201.00	305.00
5% ACETIC ACID											
EXTRACTABLE METALS ug/g											
Aluminum	110.00	167.00	150.00	170.00	156.00	187.00	153.00	233.00	132.00	135.00	137.00
Arsenic	<1.00	<1.00	<1.00	<1.00	2.00	<1.00	2.00	<1.00	<1.00	1.00	2.00
Barium		<1.00	<1.00		4.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Cadmium	<1.00	<1.00	<1.00	<1.00	6.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Chromium	<1.00	2.00	<1.00	<1.00	2.00	2.00	<1.00	1.00	1.00	1.00	1.00
Lead	26.00	85.00	90.00	14.00	320.00	22.00	29.00	38.00	16.00	28.00	30.00
Mercury	<1.00			<1.00							
Silver	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Zinc		58.00	41.00		687.00	9.00	4.00	12.00	4.00	9.00	10.00
DTPA											
EXTRACTABLE METALS ug/g											
Iron	330.00			380.00							
Manganese	3.00			4.00							
Zinc	6.00			1.00							

(1) Tons/1000 Tons
(2) T CaCO3/1000 Tons
ISS = Insufficient Sample

UPPER BLACKFOOT MINES
Soil Analysis

Parameter	Anaconda E 34031 11-16-90	Mike Horse Comp. #1 17234 6-25-90	Mike Horse Comp. #2 17235 6-25-90	Mike Horse Comp. #3 17236 6-25-90	Mike H Dump Slope 34039 11-15-90	Mike Bench C-1 34037 11-15-90	Upper Mikes Seep C-1 34038 11-15-90	Upper Mike E C-2 34035 11-15-90	Upper Mik CR Bank C-1 34036 11-15-90	Upper Mike W C-1 34033 11-15-90	Upper Mike E C-1 34034 11-15-90
pH (s.u.)	2.80	5.90	6.60	3.50	7.20	5.90	4.00	5.80	6.10	3.60	5.80
Cond. (mmhos/cm)	4.52	2.99	2.84	3.84	3.55	2.35	5.69	0.39	1.90	15.28	0.69
Lime Requirement (1)	9.00	<1.00	<1.00	3.10	<.10	<.10	5.00	<.10	<.10	9.00	<.10
Total Sulfur, %	1.73	5.28	7.16	1.58	7.87	1.49	1.87	0.24	0.41	5.47	0.05
Hot H2O Ext Sulfur %	0.46	<.01	<.01	0.30	0.48	<.01	0.38	0.01	<.01	1.36	0.01
HCL Ext Sulfur, %	0.44	<.01	2.02	0.79	<.01	<.01	0.59	0.06	0.05	0.79	0.03
HNO3 Ext Sulfur, %	0.62	4.49	3.99	0.22	5.64	1.31	0.59	0.17	0.35	2.65	0.01
Residual Sulfur, %	0.21	0.79	1.15	0.27	1.75	0.18	0.31	<.01	0.01	0.67	<.01
Nitrate as N, ug/g		<1.00	<1.00	<1.00							
Phosphorus, ug/g		1.50	0.20	4.40							
Potassium, ug/g		71.00	60.00	67.00							
Lime as CaCO3, %	<.10	7.10	13.90	<.10	10.80	1.20	<.10	0.20	1.30	0.70	0.20
Neut. Pot. (2)	<1.00	71.00	139.00	<1.00	108.00	12.00	<1.00	2.00	13.00	7.00	2.00
Acid Pot., meq/100g		330.00	448.00	80.00	462.00	93.00	93.00	14.00	26.00	257.00	3.00
Acid-Base Pot. (2)	-40.00	-94.00	-85.00	-40.00	-123.00	-35.00	-47.00	-5.00	1.00	-122.00	1.00
EPA METHOD 3050 TOTAL METALS, ug/g:											
Aluminum	1490.00	12600.00	10700.00	2420.00	9520.00	7130.00	1570.00	4550.00	12200.00	3620.00	5050.00
Arsenic	234.00	93.00	115.00	50.00	168.00	25.00	59.00	59.00	47.00	164.00	96.00
Barium	96.00				<5.00	138.00	<5.00	236.00	274.00	37.00	550.00
Cadmium	<5.00	72.00	103.00	16.00	129.00	20.00	19.00	10.00	9.00	35.00	26.00
Chromium	<5.00	19.00	21.00	<10.00	18.00	5.00	<5.00	<5.00	9.00	<5.00	<5.00
Copper	883.00				857.00	701.00	1100.00	697.00	126.00	3370.00	243.00
Gold	<5.00				13.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Iron	52100.00				84400.00	40400.00	17600.00	31500.00	20000.00	46500.00	30700.00
Lead	5120.00	5760.00	11900.00	22000.00	2240.00	2610.00	504.00	12480.00	2520.00	8120.00	4580.00
Manganese											
Mercury		<10.00	<10.00	<10.00							
Silver	1490.00	14.00	19.00	20.00	20.00	7.00	<5.00	35.00	9.00	40.00	9.00
Zinc	171.00				19100.00	3020.00	3290.00	1010.00	1570.00	5860.00	2040.00
5% ACETIC ACID EXTRACTABLE METALS ug/g											
Aluminum	143.00	280.00	220.00	130.00	106.00	88.00	136.00	38.00	105.00	196.00	14.00
Arsenic	1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	32.00	<1.00	1.00	<1.00
Barium	<1.00				<1.00	4.00	<1.00	39.00	14.00	<1.00	15.00
Cadmium	<1.00	15.00	17.00	1.00	17.00	6.00	3.00	2.00	4.00	4.00	4.00
Chromium	<1.00	3.00	2.00	1.00	2.00	<1.00	<1.00	<1.00	<1.00	2.00	<1.00
Lead	36.00	2110.00	1970.00	72.00	1110.00	384.00	42.00	3020.00	209.00	32.00	376.00
Mercury		<1.00	<1.00	<1.00							
Silver	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Zinc	9.00				2880.00	557.00	265.00	67.00	460.00	483.00	140.00
DTPA EXTRACTABLE METALS ug/g											
Iron		48.00	54.00	53.00							
Manganese		26.00	23.00	44.00							
Zinc		340.00	460.00	120.00							

(1) Tons/1000 Tons
(2) T CaCO3/1000 Tons
ISS = Insufficient Sample

UPPER BLACKFOOT MINES
Soil Analysis

Parameter	Mike Cr Bank C-1 34032 11-15-90	Mike CR Bank C.1.2 34040 11-15-90	Mike CR Bank C.1.2 34040DUP 11-15-90	Edith Composite 17231 6-25-90	Edith E Composite 34019 11-16-90	Edith S Composite 34021 11-16-90	Edith W Composite 34020 11-16-90	Edith W Composite 34020DUP 11-16-90	Mary P Composite 34044 11-16-90	Mary P Composite 17230 6-25-90	Mary P Composite 17230DUP 6-25-90
pH (s.u.)	5.20	5.10	5.10	3.00	1.20	2.30	3.40	3.40	1.60	1.70	1.50
Cond. (mmhos/cm)	3.09	2.57	2.31	4.34	19.09	5.71	6.32	6.12	13.85	13.90	13.80
Lime Requirement (1)	2.00	2.00	2.00	10.00	27.00	20.00	6.00	6.00	32.00	20.00	20.00
Total Sulfur, %	0.35	0.29	0.28	0.96	3.52	0.95	1.34	1.35	5.66	12.80	13.10
Hot H2O Ext Sulfur %	0.01	0.02	0.02	0.06	<.01	0.17	0.40	0.38	1.17	<.01	<.01
HCL Ext Sulfur, %	<.01	<.01	<.01	0.17	0.18	0.34	0.18	0.20	<.01	<.01	<.01
HNO3 Ext Sulfur, %	0.32	0.26	0.24	0.63	3.06	0.33	0.65	0.67	4.16	10.50	10.80
Residual Sulfur, %	0.02	0.01	0.02	0.10	0.28	0.11	0.11	0.10	0.33	2.29	2.28
Nitrate as N, ug/g				<1.00						<1.00	<1.00
Phosphorus, ug/g				2.50						<.10	<.10
Potassium, ug/g				55.00						40.00	43.00
Lime as CaCO3, %	0.90	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10
Neut. Pot. (2)	9.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Acid Pot., meq/100g	21.00	17.00	16.00	56.00	220.00	49.00	59.00	61.00	281.00	800.00	819.00
Acid-Base Pot. (2)	-1.00	-8.00	-8.00	-28.00	-110.00	-24.00	-29.00	-30.00	-140.00	-400.00	-409.00
EPA METHOD 3050 TOTAL METALS, ug/g:											
Aluminum	11200.00	13600.00	11600.00	7450.00	2720.00	5810.00	4840.00	4820.00	4490.00	1350.00	ISS
Arsenic	42.00	34.00	33.00	27.00	<5.00	<5.00	10.00	11.00	107.00	159.00	ISS
Barium	169.00	218.00	184.00		159.00	117.00	51.00	58.00	<5.00		
Cadmium	15.00	11.00	10.00	<10.00	<5.00	<5.00	<5.00	<5.00	5.00	11.00	ISS
Chromium	6.00	8.00	6.00	13.00	<5.00	6.00	6.00	7.00	10.00	<10.00	ISS
Copper	565.00	512.00	519.00		383.00	733.00	791.00	737.00	1010.00		
Gold	<5.00	<5.00	<5.00		<5.00	<5.00	<5.00	<5.00	<5.00		
Iron	42000.00	44600.00	41200.00		35800.00	13400.00	22200.00	26200.00	65700.00		
Lead	1710.00	1840.00	1780.00	241.00	119.00	31.00	122.00	167.00	3980.00	14600.00	ISS
Manganese											
Mercury				<10.00						<10.00	ISS
Silver	<5.00	<5.00	<5.00	<10.00	<5.00	<5.00	<5.00	<5.00	28.00	18.00	ISS
Zinc	2410.00	1850.00	1860.00		13.00	6.00	19.00	17.00	888.00		
5% ACETIC ACID EXTRACTABLE METALS ug/g											
Aluminum	139.00	109.00	103.00	64.00	619.00	100.00	101.00	98.00	151.00	36.00	36.00
Arsenic	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Barium	3.00	3.00	3.00		<1.00	<1.00	<1.00	<1.00	<1.00		
Cadmium	5.00	4.00	3.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Chromium	2.00	1.00	1.00	<1.00	2.00	1.00	3.00	2.00	<1.00	<1.00	<1.00
Lead	274.00	154.00	155.00	8.00	<1.00	<1.00	5.00	4.00	33.00	37.00	36.00
Mercury				<1.00						<1.00	<1.00
Silver	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Zinc	763.00	515.00	503.00		1.00	1.00	2.00	2.00	53.00		
DTPA EXTRACTABLE METALS ug/g											
Iron				210.00						470.00	460.00
Manganese				2.00						2.00	2.00
Zinc				1.00						19.00	18.00

(1) Tons/1000 Tons
(2) T CaCO3/1000 Tons
ISS = Insufficient Sample

Parameter	Mystery Mine C-1 34015 11-15-90	Mystery Mine C-2 34016 11-15-90	Dam Backfill Borrow Comp 34017 11-15-90	Fill Borrow Composite 34018 11-15-90	Lower Paymaster 34022 11-16-90	Cr Bank C-1 34041 11-16-90	Cr Bank C-2 34042 11-16-90	Cr Bank C-3 34043 11-16-90	Meadow CR 1 34045 11-16-90	Meadow CR 2 34046 11-16-90
pH (s.u.)	1.80	7.70	3.20	6.90	1.20	7.10	6.60	6.10	5.80	6.10
Cond. (mmhos/cm)	6.22	1.20	1.56	0.38	11.35	3.78	2.63	3.56	0.60	0.28
Lime Requirement (1)	19.00	<.10	10.00	<.10	26.00	<.10	<.10	<.10	5.00	<.10
Total Sulfur, %	1.66	1.26	0.20	<.01	4.28	7.23	2.18	1.02	<.01	<.01
Hot H2O Ext Sulfur %	1.14	0.19	0.05	<.01	0.81	<.01	0.55	0.01	<.01	<.01
HCL Ext Sulfur, %	0.40	<.01	0.15	<.01	<.01	<.01	<.01	0.09	<.01	<.01
HNO3 Ext Sulfur, %	0.09	1.00	<.01	<.01	3.17	7.01	1.45	0.89	<.01	<.01
Residual Sulfur, %	0.03	0.07	<.01	<.01	0.30	0.22	0.18	0.03	<.01	<.01
Nitrate as N, ug/g									2.00	1.50
Phosphorus, ug/g									8.10	8.50
Potassium, ug/g									234.00	123.00
Lime as CaCO3, %	<.10	14.60	<.10	0.50	<.10	7.20	10.60	0.80	<.10	<.10
Neut. Pot. (2)	<1.00	146.00	<1.00	5.00	<1.00	72.00	106.00	8.00	<1.00	<1.00
Acid Pot., meq/100g	33.00	67.00	9.00	0.00	217.00	452.00	102.00	63.00	0.00	0.00
Acid-Base Pot. (2)	-16.00	113.00	-5.00	5.00	-108.00	-154.00	55.00	-23.00	0.00	0.00
EPA METHOD 3050 TOTAL METALS, ug/g:										
Aluminum	1190.00	2030.00	7100.00	4400.00	2320.00	5280.00	7770.00	9720.00	20800.00	15000.00
Arsenic	157.00	78.00	36.00	<5.00	296.00	166.00	85.00	39.00	23.00	11.00
Barium	63.00	190.00	187.00	124.00	30.00	<5.00	5.00	54.00	1160.00	1100.00
Cadmium	<5.00	<5.00	<5.00	<5.00	<5.00	27.00	43.00	10.00	<5.00	<5.00
Chromium	<5.00	<5.00	6.00	<5.00	<5.00	<5.00	<5.00	7.00	12.00	8.00
Copper	93.00	56.00	90.00	31.00	256.00	656.00	1270.00	296.00	90.00	106.00
Gold	<5.00	<5.00	<5.00	<5.00	<5.00	15.00	<5.00	<5.00	<5.00	<5.00
Iron	41700.00	26400.00	29100.00	12950.00	41300.00	84600.00	44600.00	35200.00	33500.00	36400.00
Lead	1130.00	146.00	350.00	53.00	2340.00	520.00	1080.00	797.00	118.00	109.00
Manganese										
Mercury										
Silver	8.00	<5.00	<5.00	<5.00	22.00	10.00	18.00	<5.00	<5.00	<5.00
Zinc	220.00	529.00	184.00	65.00	187.00	3510.00	6610.00	1670.00	803.00	750.00
5% ACETIC ACID EXTRACTABLE METALS ug/g										
Aluminum	136.00	78.00	118.00	57.00	74.00	83.00	354.00	111.00	48.00	78.00
Arsenic	<1.00	<1.00	<1.00	<1.00	3.00	<1.00	24.00	<1.00	<1.00	<1.00
Barium	<1.00	12.00	2.00	32.00	<1.00	1.00	5.00	4.00	200.00	141.00
Cadmium	<1.00	1.00	<1.00	<1.00	<1.00	8.00	14.00	3.00	<1.00	1.00
Chromium	<1.00	2.00	<1.00	1.00	<1.00	<1.00	<1.00	43.00	<1.00	<1.00
Lead	22.00	26.00	<1.00	8.00	13.00	354.00	2690.00	99.00	<1.00	<1.00
Mercury										
Silver	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Zinc	33.00	121.00	9.00	4.00	7.00	1110.00	1870.00	414.00	41.00	143.00
DTPA EXTRACTABLE METALS ug/g										
Iron										
Manganese										
Zinc										

(1) Tons/1000 Tons
(2) T CaCO3/1000 Tons
ISS = Insufficient Sample

APPENDIX B.

ENGINEERING EVALUATION/COST ASSESSMENT

ENGINEERING EVALUATION/COST ANALYSIS

Site(s): Upper Blackfoot - all sites

Problem: Acid Generating Devegetated Spoils

Potential Action	Technical Feasibility	Effectiveness	Health & Safety Impact	Environmental Impact	Implementability	Cost	Appropriate Technology	Consistent with Future Use	Legally Permissible	Liability	Construction Time	Longevity/ Maintenance		Total Ranking
No Action	+	●	-	●	+	+	-	+	o	o	+	-		-2
Haul Off Site to Lisc. Disposal	-	+	o	o	+	-	+	+	+	o	o	o		+5
On-Site Disposal	+	+	o	o	+	+	+	+	+	o	o	◇		+7
In-place Disposal	+	●	◇	o	+	+	◇	+	+	o	o	o		+8
Pond/Flood Disposal	◇	+	o	o	o	-	o	o	o	◇	o	o		0
Centralized Disposal	◇	+	o	o	+	◇	o	+	o	o	+	o		+4
RCRA Liner Disposal	◇	+	+	o	+	-	◇	+	+	+	o	●		+6
Backfill in Mine	+	●	●	●	-	o	+	+	o	o	o	◇		+3
Neutralize Spoils	+	+	o	●	+	o	+	+	+	+	+	◇		+7
Grade	+	o	o	◇	+	+	+	+	+	o	+	o		+7
Coversoil	+	●	o	●	o	o	+	+	+	+	o	+		+7
Seed, Fertilize, & Mulch	+	+	+	+	+	+	+	+	+	+	+	+		+12
Fence & Sign	+	o	+	●	+	+	+	◇	+	o	+	◇		+3
Sediment Ponds	+	o	o	+	+	+	+	+	o	o	+	●		+6
Process/Treatment	+	-	◇	+	-	-	+	+	o	o	+	+		+7

Ranking Legend:
+ Desirable
o Acceptable
- Undesirable

ENGINEERING EVALUATION/COST ANALYSIS

Site(s): Upper Blackfoot - Carbonate, Anaconda, Mike Horse

Problem: Mine-Impacted Drainage

Potential Action	Technical Feasibility	Effectiveness	Health & Safety Impact	Environmental Impact	Implementability	Cost	Appropriate Technology	Consistent with Future Use	Legally Permissible	Liability	Construction Time	Longevity/ Maintenance		Total Ranking
No Action	+	+	-	-	●	+	-	-	◇	o	+	-		-2
Grade Drainage	+	+	◇	o	+	+	+	+	o	+	o	+		+8
Stabilize & Channel (Riprap)	●	+	+	+	+	o	+	+	+	+	o	+		+10
Revegetate	+	+	+	+	+	+	●	+	+	+	+	+		+12
Settling Ponds	+	+	+	+	+	+	+	+	+	+	+	o		+11
Energy Dissipators	+	+	+	+	o	◇	◇	+	+	●	o	+		+8
Small Dams	+	+	+	+	◇	◇	o	+	+	+	o	+		+8
Liner Installation	+	+	+	+	◇	◇	o	+	+	●	o	+		+8
Fence & Sign	+	-	-	-	+	+	-	+	o	-	-	o		-2

Ranking Legend:
+ Desirable
o Acceptable
- Undesirable

ENGINEERING EVALUATION/COST ANALYSIS

Site(s): Upper Blackfoot - Carbonate, Mary P, Anaconda, Mike Horse

Problem: Steep Devegetated Slopes (including highwalls and subsidence)

Potential Action	Technical Feasibility	Effectiveness	Health & Safety Impact	Environmental Impact	Implementability	Cost	Appropriate Technology	Consistent with Future Use	Legally Permissible	Liability	Construction Time	Longevity/ Maintenance		Total Ranking
No Action	+	+	-	-	+	+	-	-	o	-	-	+		+3
Regrade to Stabilize	+	+	+	+	o	◇	●	+	+	◇	◇	o		+7
Fill to Stabilize	◇	+	+	o	o	◇	o	o	+	o	o	o		+3
Terracing	◇	+	+	+	o	◇	+	+	+	o	◇	o		+6
Revegetate	+	+	+	+	●	+	-	+	●	-	-	+		+12
Remove Spoils	o	+	+	◇	◇	+	o	+	o	◇	-	+		+2
Erosion Mat Control	+	+	o	+	●	+	+	+	+	+	o	+		+8
Log Stabilization Structures	+	+	o	+	+	-	●	+	+	+	o	+		+8
Geo Fabrics	+	+	o	+	o	+	o	+	●	-	o	+		+6
Riprap Slope	+	+	o	+	+	+	+	+	+	+	o	+		+8
Down Gradient Settling Ponds	+	+	+	+	+	+	●	+	+	+	●	o		+11
Transplant to Revegetate	+	-	+	+	+	◇	●	+	+	+	o	+		+10
Coversoil	+	+	+	+	o	o	o	+	+	+	o	o		+7
Fence & Sign	+	-	-	-	●	+	-	-	o	-	●	o		+2

Ranking Legend:
+ Desirable
o Acceptable
- Undesirable

ENGINEERING EVALUATION/COST ANALYSIS

Site(s): Upper Blackfoot - Carbonate, Anaconda, Mike Horse

Problem: Mine Spoils in Contact with Water

Potential Action	Technical Feasibility	Effectiveness	Health & Safety Impact	Environmental Impact	Implementability	Cost	Appropriate Technology	Consistent with Future Use	Legally Permissible	Liability	Construction Time	Longevity/ Maintenance		Total Ranking
No Action	+	-	-	+	+	●	-	-	o	●	+	+		-3
Settling Pond	+	-	-	◇	+	+	-	●	o	o	+	-		+1
Pipe Water Around	+	o	o	o	o	◇	+	+	o	o	o	o		+3
Rehabilitate Drainage	+	o	o	o	o	o	o	-	o	o	o	o		+2
Drainage Liner Installation	+	o	o	o	o	o	o	+	o	o	o	o		+2
Remove Spoils	+	●	-	+	o	-	o	+	o	o	o	+		+5
Water Treatment Below	◇	●	-	o	o	-	o	o	o	o	-	-		-3
Eliminate Water Flow	+	●	o	o	●	-	-	o	-	o	-	-		●
Realign Drainage	+	o	o	o	+	-	o	o	o	o	o	o		+1
Fence & Sign	+	-	-	+	+	●	-	-	o	-	+	+		-3

Ranking Legend:
+ Desirable
o Acceptable
- Undesirable

ENGINEERING EVALUATION/COST ANALYSIS

Site(s): Upper Blackfoot - Carbonate, Edith, Anaconda, Mike Horse

Problem: Mine Related Structures

Potential Action	Technical Feasibility	Effectiveness	Health & Safety Impact	Environmental Impact	Implementability	Cost	Appropriate Technology	Consistent with Future Use	Legally Permissible	Liability	Construction Time	Longevity/ Maintenance		Total Ranking
No Action	+	-	-	-	+	●	o	-	-	-	+	-		-1
Demolish & Remove	●	+	+	+	+	o	+	+	+	+	o	+		+10
Repair	o	o	o	o	-	o	o	●	●	o	o	●		-2
Fence & Sign	●	-	-	○	+	●	●	●	o	o	o	o		-1

Ranking Legend:
+ Desirable
o Acceptable
- Undesirable

ENGINEERING EVALUATION/COST ANALYSIS

Site(s): Upper Blackfoot - Carbonate, Edith, Anaconda, Mike Horse

Problem: Hazardous Mine Openings

Potential Action	Technical Feasibility	Effectiveness	Health & Safety Impact	Environmental Impact	Implementability	Cost	Appropriate Technology	Consistent with Future Use	Legally Permissible	Liability	Construction Time	Longevity/ Maintenance		Total Ranking
No Action	+	-	-	-	+	+	-	-	+	-	+	-		-2
Fence & Sign	+	-	-	o	+	+	-	-	o	o	+	o		0
Backfill Closure	+	+	+	+	+	+	+	+	+	+	+	+		+12
Constructed Closure	+	o	o	o	+	+	+	o	+	o	+	o		+6

Ranking Legend:
+ Desirable
o Acceptable
- Undesirable

ENGINEERING EVALUATION/COST ANALYSIS

Site(s): Upper Blackfoot - Carbonate, Anaconda, Mike Horse

Problem: Acid Mine Drainage (AMD)

Potential Action	Technical Feasibility	Effectiveness	Health & Safety Impact	Environmental Impact	Implementability	Cost	Appropriate Technology	Consistent with Future Use	Legally Permissible	Liability	Construction Time	Longevity/ Maintenance		Total Ranking
No Action	+	-	-	-	+	+	-	-	o	+	-	-		-3
Constructed Wetland	+	-	●	+	+	o	+	+	●	o	o	o		+8
Limestone Trench	+	-	+	-	+	o	+	+	+	+	◦	o		+9
Treatment Facility	+	+	o	o	◦	-	o	o	+	o	o	-		+1
Air Seal Mine Opening	o	-	o	o	+	●	-	+	+	o	o	o		-2
Water Seal Mine Opening	o	-	o	o	-	-	-	+	-	o	◦	o		-2
Bacterial Injection	o	o	o	o	-	-	o	+	o	o	o	-		-2
Water Recharge Reduction	o	-	o	o	+	o	o	+	o	+	o	●		-2
Surfactant Injection	o	o	o	o	+	-	o	+	◦	o	o	●		+2
Collapse Mine Workings	o	-	o	-	-	o	-	+	o	◦	◦	o		-3
Pipe Drainage Elsewhere	+	o	o	o	+	o	o	o	o	o	o	o		+2
Channelize Control	+	o	o	o	+	o	+	o	◦	o	◦	o		+3
Artificially Recharge Groundwater	●	o	o	-	o	o	-	o	o	o	o	o		-1
Irrigate Surrounding Area with AMD	o	o	o	-	o	-	-	-	o	-	o	-		-6
Fence & Sign	+	-	-	-	+	+	-	-	o	+	+	o		-2
Phosphate/zeolites	o	o	o	o	o	o	o	+	+	o	o	o		+2

Ranking Legend:
+ Desirable
o Acceptable
- Undesirable

APPENDIX C.

AGENCY RESPONSE LETTERS

DEPARTMENT OF NATURAL RESOURCES
AND CONSERVATION

STAN STEPHENS, GOVERNOR

LEE METCALF BUILDING
1520 EAST SIXTH AVENUE

STATE OF MONTANA

DIRECTOR'S OFFICE (406) 444-6699
TELEFAX NUMBER (406) 444-6721

HELENA, MONTANA 59620-2301

RECEIVED
JAN 14 1991
ROBERT PECCIA
& ASSOCIATES

January 10, 1991

Mr. Robert Morton, Reclamation Scientist
Robert Peccia and Associates
P.O. Box 5653
Helena, MT 59601

Re: Environmental Assessments (EAs) for Abandoned Mine Reclamation Sites in Powell, Jefferson, and Lewis and Clark Counties

Dear Mr. Morton:

This is in response to Ms. Susan McAnally's letter of January 7, 1991 regarding regulatory input for the above-referenced EAs.

There are no designated floodplains for the waterways affected by the following sites:

1. Powell County Limestone Quarry
   SW¼ Sec.32, T10N, R6W and NW¼ Sec.5, T9N, R6W

2. Nellie Grant Mine
   Secs. 14 & 15, T8N, R5W

3. Upper Blackfoot Mine
   Secs. 20,21,27,28,29, T15N, R6W and Sec.24, T15N, R7W

4. York Mining District
   Secs. 4,5,6,9,10,11,13,14,15,16, T11N, R1W

Susan had indicated in her letter to me that mine related spoils will likely be removed from the floodplain in the Upper Blackfoot project area. Upon closer investigation, the limits of the detailed study area which delineates floodplain areas on the upper Blackfoot River end downstream of where the project site is located. Therefore no designated floodplains exist at the Upper Blackfoot project area.

As such, the Floodplain Management Section of the Department of Natural Resources and Conservation does not have authority to regulate activities for the above project sites. Other permits

will likely be required and I am enclosing a pamphlet entitled "A Guide to Stream Permitting in Montana" which outlines required permits and the appropriate contact agencies. If you do not already have this publication, it may help in your EA development.

Also, I have replaced John Hamill as the Floodplain Management Supervisor at the DNRC. Please note this for any future correspondence.

If you have any questions or comments, please call me at 444-6646.

Sincerely,

Gary R. Fischer

Gary R. Fischer, P.E.
Floodplain Management Supervisor
Engineering Bureau

GRF/dmk
Enclosure

cc: Susan McAnally, DSL, AMR Bureau

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Federal Building, U.S. Courthouse
301 South Park
P.O. Drawer 10023
Helena, Montana 59626

RECEIVED
JAN 25 1991
ROBERT PECCIA
& ASSOCIATES

IN REPLY REFER TO:
FWE-61130-Billings
M.40-Montana Dept. of State Lands

January 23, 1991

Robert Morton, Reclamation Specialist
Robert Peccia and Associates
P.O. Box 5653
Helena, Montana 59601

Dear Mr. Morton:

The U.S. Fish and Wildlife Service (Service) received a request from Susan McAnally, Abandoned Mine Reclamation Bureau of the Montana Department of State Lands requesting Service comments on birds of high Federal interest that may be affected by abandoned mine reclamation projects. The four specific project sites identified were in Powell, Jefferson and Lewis and Clark counties.

Two species, the bald eagle (Haliaeetus leucocephalus) and peregrine falcon (Falco peregrinus), are endangered species that may occur within the proposed project areas. These species are provided protection by the Endangered Species Act (Act) of 1973, as amended. The Act requires Federal agencies to insure that any action authorized, funded or carried out by such agency is not likely to jeopardize the continued existence of any listed species.

Both peregrine falcons and bald eagles may occur in the area as spring and/or fall migrants, and bald eagles may occur as year-long residents. We are not aware of peregrine falcon or bald eagle nest territories within the project area, nor are we aware of significant habitats for these species in the project area.

The Swainsons hawk is a candidate species being considered for listing as either endangered or threatened under the Act. One of the reasons the Service prepares Notices of Review for candidate species is to solicit information on candidate species that may assist the Service in any possible listing process. The Service recommends the Environmental Assessments (EA's) for these projects consider impacts, if any, to this species.

The Migratory Bird Treaty Act provides general protection to most species of migratory birds. Any unique nesting, wintering or other concentration areas for migratory birds in the project area should be addressed in the EA's. In addition, the Bald Eagle Protection Act extends additional protection to both bald and golden eagles, their nests and nest sites.

We appreciate your efforts to consider and conserve endangered species, migratory birds and their habitats. Questions regarding the Service's comments should be addressed to Dennis Christopherson (406-657-6750).

Sincerely,

Kemper McMaster
Field Supervisor
Montana/Wyoming Field Office

FOR

cc: Susan McAnally, Montana Dept. of State Lands (Helena, MT)
Billings Suboffice, USFWS, Fish & Wildlife Enhancement (Billings, MT)

DMC/dc

"Take Pride in America"

United States
Department of
Agriculture

Soil
Conservation
Service

F.O.B. Drawer 10022
301 South Park
Helena, MT 59626
Phone: (406) 449-5278

January 15, 1991

RECEIVED
JAN 16 1991
ROBERT PECCIA
& ASSOCIATES

Robert Morton, Reclamation Specialist
Robert Peccia and Associates
PO Box 5653
Helena, MT 59604

Dear Mr. Morton:

Per a request by Susan McAnally, Abandoned Mine Reclamation Bureau, the following are comments on proposals to reclaim abandoned mines in Powell, Jefferson and Lewis and Clark Counties:

1. Based upon our soils information, there does not appear to be any unique, prime or important agricultural lands present on any of the project locations.

2. We strongly encourage that species selection for the revegetation of these sites be adaptable with the material being stabilized, as well as be compatible with the surrounding land use and adjacent plant communities.

Thank you for the opportunity to comment.

Sincerely,

Warren Kellogg

Warren Kellogg
District Conservationist

WGK/cjo

c: Susan McAnally, DSL

DEPARTMENT OF STATE LANDS

STAN STEPHENS, GOVERNOR

CAPITOL STATION

STATE OF MONTANA

(406) 444-2074

1625 ELEVENTH AVENUE
HELENA, MONTANA 59620

July 19, 1989

Kathy Huppe
SHPO
225 North Roberts
Helena, MT. 59620

RE: Heddleston Mining District

Dear Kathy:

As you are probably aware, a cultural resource inventory was completed for the Mike Horse Mine in 1985. The Mike Horse Mine was determined not to be eligible for listing with the National Historic Register. Your office concurred with this determination and agreed reclamation could proceed at the Mike Horse.

As part of a resource indemnity trust fund grant from the Department of Natural Resources and Conservation, four additional mine sites within the Heddleston District are proposed reclamation sites. Enclosed is a cultural resource inventory and evaluation for the Anaconda Mine, Mary P. Mine, Edith Mine, and Carbonate Mine.

Please review and comment on this document. Should you concur with GCM's summary and recommendations, please respond to this office in a fashion that can be copied and sent to DNRC indicating that cultural and historic compliance obligations have been met for the RIT Program.

Thank you for your time and consideration on this matter.

Sincerely,

Ben Mundie
Geologist/Reclamation Specialist
Abandoned Mine Reclamation Bureau
Reclamation Division

/nn

"AN EQUAL OPPORTUNITY EMPLOYER"

State Historic Preservation Office
Montana Historical Society
Mailing Address: 225 North Roberts • Helena, MT 59620-9990
Office Address: 102 Broadway • Helena, MT • (406) 444-7715

August 9, 1989

Ben Mundie, Geologist/Reclamation Specialist
Abandoned Mine Reclamation Bureau
Reclamation Division
Montana Department of State Lands
1625 Eleventh Avenue
Helena, MT 59620

Re: Heddleston Mining District

Dear Ben:

Thank you for the opportunity to comment on the cultural resource report referenced above. We concur with your consultant that too little remains of the historic mining operations at 24LC888, 889, 890 and 891 for any of the mines to qualify as State Heritage Properties. Reclamation at those mines should be able to proceed without threat to significant cultural resources. For the record, though, Ben, we would appreciate receiving maps with each site location plotted for attachment to the site forms. There are no maps in our copy of the report or on our copies of the site forms.

Sincerely,

Kathryn Huppe

Katherine M. Huppe
Historical Survey Reviewer

File: Comp/DSL-AMR 1989

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES

STAN STEPHENS, GOVERNOR

STATE OF MONTANA

FAX # (406) 444-2606

HELENA, MONTANA 59620

RECEIVED
JAN 2 3 1991
ROBERT PECCIA
& ASSOCIATES
CROSSWELL BUILDING

January 23, 1991

RECEIVED
JAN 24 1991
DEPT. OF STATE LANDS

Susan McAnally
Abandoned Mine Reclamation Bureau
Department of State Lands
1625 Eleventh Avenue
Helena, MT 59620

Dear Susan,

Thank you for your letter requesting comments on the Bureau's jurisdiction over the reclamation efforts being carried out by DSL at the Upper Blackfoot, Nellie Grant and Limestone Quarry sites. Each of the three projects will require a 3A Authorization (Short-term Exemption form State Surface Water Quality Turbidity Standards) for the proposed reclamation activity, including access routes that may impact nearby waterbodies. In addition, the projects may require a MPDES discharge permit for any activity that may create a discharge to state waters. The project manager should request a determination from our permits section as to necessity of the discharge permit for each project. Please note also that the Bureau provides state certification for all individual 404 permit applications under consideration by the Corps of Engineers. DSL should also contact the Corps in regard to the necessary 404 permits.

The Bureau is interested in reviewing the EA for each of the projects to ascertain the potential water quality impacts of each project and to ensure that the selected alternatives have considered water quality and made all efforts to minimize or avoid impacts to state waters. We are also interested in the monitoring plans for each project in that we would expect water quality to be improved as a result of the project and believe that improvement should be well documented.

If you have any questions or need further information, please feel free to contact this office.

Sincerely,

Jack G. Thomas
Environmental Programs Supervisor
Water Quality Bureau

AN EQUAL OPPORTUNITY EMPLOYER

DEPARTMENT OF NATURAL RESOURCES
AND CONSERVATION

STAN STEPHENS, GOVERNOR

LEE METCALF BUILDING
1520 EAST SIXTH AVENUE

STATE OF MONTANA

DIRECTOR'S OFFICE (406) 444-6699
TELEFAX NUMBER (406) 444-6721

HELENA, MONTANA 59620-2301

RECEIVED
JAN 15 1991
ROBERT PECCIA
& ASSOCIATES

January 11, 1991

Mr. Robert Morton, Reclamation Scientist
Robert Peccia & Associates
P.O. Box 5653
Helena, MT 59601

Dear Mr. Morton:

This letter is a follow-up to our telephone conversation of January 11, 1991 concerning Mine Reclamation at four sites in Powell, Jefferson and Lewis & Clark Counties. Our comments are as follows:

1. For the Upper Blackfoot and Nellie Grant sites, prior to construction of a dam, it may be necessary to request a hazard classification from this department. If any dam or series of dams could impound 50 acre-feet of water (to the crest of the dam) or more, the dam falls under the requirements of the State Dam Safety Act, and a hazard classification is required. (ARM 36.14.201)

2. For the York Mining District site, if any of the dams to be removed could impound 50 acre-feet of water or more, a hazard classification would also be necessary. (ARM 36.14.201) The breach must be excavated to the natural ground and be able to pass the 100-year, 24-hour flood at a depth and velocity equivalent to the natural channel. (ARM 36.14.504)

Enclosed for your use is an application for hazard classification.

If you have any questions, please contact me at 444-6664.

Sincerely,

Mark M. Peterson
Dam Safety Engineer
Dam Safety Section

MMP/dmk

Enclosure

cc: Susan McAnally, DSL

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES
WATER QUALITY BUREAU

STAN STEPHENS, GOVERNOR

Room A-206
COGSWELL BUILDING

STATE OF MONTANA

FAX # (406) 444-2606-1374
Phone (406) 444-2406

[illegible] MONTANA 59620

RECEIVED
FEB 04 1991
ROBERT PECCIA
& ASSOCIATES

January 29, 1991

Robert Peccia, P. E.
Robert Peccia & Associates
P. O. Box 5653
Helena, MT 59604

Dear Bob:

Representatives of your firm have asked me about our policy regarding MPDES permits for wetlands designed to passively treat abandoned mine lands (AML) drainage when installed as a part of AML reclamation projects.

We would require MPDES permits and/or temporary turbidity variances during construction to minimize sedimentation problems instream. In the long term, however, assuming a monitoring program shows water quality improvement through the passive treatment, no MPDES permit will be required. The only exception to this that I can think of might be in a case where a poor quality seep might be proposed to be treated and discharged directly to a stream. In this case, the overall stream water quality might be made worse without strict quality limitations in a MPDES permit.

I hope this clarifies our position. If you have other questions, feel free to contact me at 444-2406.

Sincerely yours,

Frederick C. Shewman, P.E., Supervisor
Permits Section
Water Quality Bureau
Environmental Sciences Division

FCS:dd/954.S

AN EQUAL OPPORTUNITY EMPLOYER

Montana Department of Fish, Wildlife & Parks

RECEIVED
JAN 16 1991
ROBERT PECCIA & ASSOCIATES

1420 East Sixth Avenue
Helena, Montana 59620
January 15, 1991

Robert Morton, Reclamation Scientist
Robert Peccia & Associates
P.O. Box 5653
Helena, MT 59604

Dear Mr. Morton:

The letter from the Department of State Lands (DSL) on January 7, 1991, solicits written comments and suggestions concerning four proposed abandoned mine projects. The correspondence also seeks comments as to the jurisdiction the Department has over a project such as those proposed by DSL.

Section 87-5-501 through 87-5-509 of the Stream Protection Act (SPA) governs all projects sponsored by an entity of state government and is administered by the Department of Fish, Wildlife and Parks.

Site specific comments and recommendations for each project, will be provided to DSL upon receipt of an SPA application and other information as stipulated by the Act.

Sincerely,

Ken Chrest

Ken Chrest
Stream Protection Coordinator
Fisheries Division

drg
C: Vincent
Leathe
Workman
File

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
215 NORTH 17TH STREET
OMAHA, NEBRASKA 68102-4978

REPLY TO
ATTENTION OF

January 31, 1991

U.S. Army Corps of Engineers
c/o DNRC/CDD
1520 East 6th Avenue
Helena, MT 59620-2301
(406)444-6670

Robert Morton, Reclamation Scientist
Robert Peccia and Associates
P.O. Box 5653
Helena, MT 59601

Dear Bob:

I apologize for being late with these comments. (Susan's letter was buried under some other papers.)

Under the authority of Section 404 of the Clean Water Act, Department of the Army permits are required for the placement of dredged or fill material below the ordinary high water mark of our nation's rivers, streams, lakes or in wetlands. Some of your proposed activities for stream reclamation such as bank stabilization, channel restoration and diversions may require 404 authorization.

Enclosed is a new brochure concerning the Corps regulatory program and also a copy of the Regional General Permit 89-03 for fish habitat structures, which we discussed on the telephone.

Sincerely,

Bob McInerney

Robert E. McInerney
Montana Field Office
Regulatory Branch
Operations Division

Enclosure

cc: Susan McAnally

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES

STAN STEPHENS, GOVERNOR

FAX #(406) 444-1499

STATE OF MONTANA

OFFICE LOCATION: 836 Front Street, Helena, Montana

MAILING ADDRESS: Cogswell Building, Helena, MT 59620

Solid and Hazardous Waste Bureau
(406) 444-2821

RECEIVED
JAN 24 1991
ROBERT PECCIA
& ASSOCIATES

MEMORANDUM

TO: Robert Morton

FROM: Vic Andersen VA

DATE: January 22, 1991

SUBJECT: AMRB projects - Nellie Grant, York, Quarry sites and Upper Blackfoot.

We have not reviewed the latest version of the procedures manual so I am not sure how the OSM EA process folds into the site investigation/feasibility study process. Thus my comments may be of limited value until you get to the actual investigative phase.

I will address the sites in the order of Susan McAnally's January 7, 1991 letter.

Nellie Grant:

1. All waste materials must be listed to determine whether or not they are hazardous wastes or "Subtitle D" wastes. Any receiving facility must be evaluated to determine whether or not they are permitted to reuse, recycle or dispose of these wastes.

2. If Group III type wastes are disposed of off-site, they must go to a Class III disposal site.

3. Most Class II landfills in Montana are not permitted to accept liquid wastes. This disposal option must be carefully evaluated.

4. Whatever remedy is chosen must comply with all applicable laws and rules and some type of criteria or measurable effect be put in place to determine the effectiveness of the remedy.

York:

1. Same comment as Nellie Grant #2.

2. See Nellie Grant comment #3 for liquids. Additionally, if these materials can be used for their original purpose that is certainly preferable to disposal options.

Quarry Sites.

1. See Nellie Grant comment #2.

Upper Blackfoot:

1. This site has been discussed extensive and my only comment is that the actions be consistent with the NCP.

2. Same as comment for Nellie Grant #2.

Again I hope these comments are of some use but without more information and actually going into the projects in detail, this is the best I can do. The Superfund program does not have the personnel to review these projects but as you develop the standard operating procedures for addressing these sites, I believe they will move toward cleanup very quickly.

cc Susan McAnally

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES

AIR QUALITY BUREAU

STAN STEPHENS, GOVERNOR

STATE OF MONTANA

FAX # (406) 444-2606

HELENA, MONTANA 59620

(406) 444-3454
FAX (406) 444-1374

RECEIVED
JAN 21 1991
ROBERT PECCIA
& ASSOCIATES

January 17, 1991

Mr. Robert Morton
Robert Peccia and Associates
P. O. Box 5653
Helena, MT 59601

Dear Bob:

The following comments are in response to the letter dated January 7, 1991, from the Abandoned Mines Reclamation Bureau of the Department of State Lands concerning preparation of Environmental Assessments (EA) on four abandoned mine reclamation projects.

The first air quality consideration for these types of projects would be the need for an air quality permit. Any source that has the potential to emit more than 25 tons per year of any pollutant is required to obtain an air quality permit with a few exceptions (ARM 16.8.1102). This is determined on a project-specific basis. The primary pollutant emitted would be particulate matter from earth moving and material handling operations and vehicle traffic. Given the scope of these specific projects, air quality permits are not required because potential particulate emissions would be well below the 25 ton limit. For future reference, it is possible that an extensive long-term reclamation project could require an air quality permit.

Regardless of the need for a permit, ARM 16.8.1401 requires that reasonable precautions be taken to control fugitive dust emissions. For these types of projects, this would most likely involve watering of roads and work areas on an as-necessary basis.

Another air quality consideration is burning of site debris. ARM 16.8.1301-1308 set forth the open burning requirements. A trade waste open burning permit would be required from the bureau for burning demolition materials. Burning of treated lumber or timbers is prohibited.

There has not been any air monitoring at the specific project sites noted in the letter; however, generic statements regarding the lack of air pollutant sources in the areas can be made. These areas would be similar

to the one described in the example EA I gave you during our recent meeting. On-site air monitoring would not be required on projects of this size.

If you have any questions, please contact me.

Sincerely,

Pat Driscoll
Environmental Engineer

PD:kmj

cc: Susan McAnally

United States Department of Agriculture
Forest Service
Helena Ranger District
2001 Poplar
Helena, MT 59601

Reply to: 2810

Date: January 14, 1991

RECEIVED
JAN 16 1991
ROBERT PECCIA
& ASSOCIATES

Mr. Robert Morton
Robert Peccia and Associates
P.O. Box 5653
Helena, MT. 59601

Dear Sir;

This correspondence is in response to Ms. Susan McAnally's letter to the Helena Ranger District dated 1/7/91 regarding the Department of State Lands' Abandoned Mine Reclamation projects scheduled for 1991. In this letter Ms. McAnally informed the Forest Service of the Department's intent to prepare Environmental Assessments for 4 proposed reclamation projects in Powell, Jefferson and Lewis and Clark Counties. The Forest Service is asked to respond with comments, questions or concerns regarding these projects and to specifically comment as to how these various reclamation projects "...may affect future Forest Service Plans relative to the project areas."

As I have indicated in earlier correspondence relative to this matter, it is extremely difficult to formulate concerns, questions and comments on these projects at this time when the projects are still so vaguely defined. Aside from reiterating our concerns relative to the Helena Forest Travel Plan, we cannot provide much in the way of meaningful analysis until the project area has been defined to the point where we are able to distinguish between National Forest lands and lands under private or other ownership. Before we can provide you with meaningful feedback we must also be aware of the particular environmental problems associated with each site and what specific reclamation proposals are available for each of these sites.

Lacking this information I can only restate our intent to cooperate with the Department in this reclamation effort in any way possible. When site maps have been prepared which distinguish between public and private lands, and which at the minimum identify the environmental hazards existing at each site, the Forest Service will promptly respond with our concerns and comments.

On a related matter, copies of the 1/7/91 letter have been forwarded to the Lincoln Ranger District for their individual response to the Upper Blackfoot Mines project. As agreed in telephone conversation, the Lincoln

District will relay their specific concerns and comments directly to Robert Peccia and Associates.

In closing, let me once again express my appreciation in being included in the formulation of these much needed reclamation projects.

Sincerely,

Denis A. Hart

DENIS A. HART
District Ranger

CC: S. McAnally, DSL

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII, MONTANA OFFICE
FEDERAL BUILDING, 301 S. PARK, DRAWER 10096
HELENA, MONTANA 59626-0096

RECEIVED
JAN 15 1991
ROBERT PECCIA
& ASSOCIATES

Ref: 8MO

January 10, 1991

Ms. Susan McAnally
Department of State Lands
Abandoned Mine Reclamation
Bureau
1625 Eleventh Avenue
Helena, Montana 59620

Dear Ms. McAnally:

The U. S. Environmental Protection Agency (EPA) is pleased to respond to your request concerning the reclamation of four mine sites in western Montana. Your basic question on jurisdiction of these activities can be answered simply.

Those activities which are proposed to occur on Federal land are subject to the policies, procedures, and requirements of the National Environmental Policy Act (NEPA) (CFR 40 Parts 1500.1 - 1500.3). A Federal agency would then determine whether to prepare an environmental impact statement (EIS) or an environmental assessment (EA) (with a finding of no significant impact - CFR 40 Part 1501.3).

Upon review of these sites, EPA was concerned to see the Nellie Grant Mine listed as a proposed abandoned mine reclamation project. It is EPA's understanding that this mine did have a State operating permit with a reclamation bond of $62,000. Would not this money be directly available for reclamation purposes?

If you need further assistance, please contact me or Jeff Bryan of my staff at 449-5486.

Sincerely,

John A. Wardell, Director
Montana Office

cc: Robert Morton, Robert Peccia and Associates

CALLED 1/16/91 JEFF - EXPLAINED SITUATION